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INDEX

TO THE FIFTH VOLUME OF THE PLANTERS' CHRONICLE.

	Vol. V/1. PAGE.	Vol. V/2. PAGE.
Abol Syringe	...	321
Acid and Alkaline Manures	... 273	463, 624
Act I of 1903	... 22, 142, 294	376, 498, 519
Act XIII of 1859	...	348, 381, 613, 623
Advertising Tea in America	... 82	
Agriculture at Annual Meetings	...	360
Agri-Horticultural Show, Singapore	...	309, 333
Aigrettes and Birdskins	...	460
Ammonia for Ceará	...	546, 665
Anacardium occidentale	... 209	
Analyses, Fertiliser, How to use	... 69	
, Rubber	... 76, 78	
, Soil	... 106	419, 514, 612
Anamalai Planters' Association...	8, 179, 284	340
Annual Meeting	... 117	
Anamalai Hospital	... 8, 118, 179	
Labour Matters	... 118	
Land Grants	... 284	
Leases	... 9, 117, 119	
Resurvey	... 9	
Roads	... 118, 179	
Animal Parasites and Diseases	... 74	
Annual Meeting of U. P. A. S. I. (1910)	... 209	
Ant Extermination	...	599
Anti-Tea-Duty League	...	350
Ants and Ceará Seed	... 189	
Ants and Scale Insects	... 236	
Ants, White	... 28	
Application of Manures	... 116, 285	
Arsikere-Mangalore Railway	...	369, 633
Artocarpus integrifolia	... 78	
Assistant to Scientific Officer	...	533, 577, 617, 629, 656
Atylosia Candollei	...	325
Bacteria and Soil Agriculture	...	608
	... 41	
Balance of Life in the Soil	... 134, 147	
Bark renewal	... 217	
Basic Slag	... 54, 81, 124	
Basic Superphosphate	... 54, 129, 189	325, 372
Beetle, Coorg Girdler	... 283	
Bengal Bar Soap	... 182	

	VOL. V/1.	VOL. V/2.
	PAGE.	PAGE.
Bengal Bean	... 15	576
Birdskins and Aigrettes	...	460
Black Blight	... 223	
Black Rot in Coffee	... 16	368, 563, 680
Blister Blight, Tea	... 27, 110, 303	
Blood Sucking Bug, A	... 208	
Blower's Solution	...	657
Bolivia, Rubber cultivation in	... 265	
Bombay-Hydro-Electric Project	...	609
Books on Rubber	... 34	547
Boom, The Coming Rubber	... 112	
Bordeaux Mixture	...81, 229, 236, 299	
and Pink Disease	... 210, 250	
, Sugar in	... 139	
Botriodiplodia theobromæ	... 140, 177	
Brazil, Coffee in	... 99	552
Brown Blight on Tea	...	531
Brown Bug	...	224
Budding Tape	... 261	
Burma, Rubber Cultivation in	...	459
, Tea in	... 27	
Cacao in Ceylon	... 60	
Camphor, Yield of	...	421, 658
Canker on Pará Rubber	...	516
Cardamons in Ceylon	... 61	
Cardamom Stealing	...	628
Carruthers, The late Mr. J. B.	...	334
Cassia hirsuta	... 5, 152	
, mimosoides	...	487, 531
, Tora	... 113, 173, 245	
Castilloa rubber	... 106, 120,	310, 390, 477,
		603
Cattle Diseases	...	376, 463, 519,
		523
Cattle Manure	... 42	
Cattle Ticks	... 281	
Ceará Rubber	... 6, 71, 199	551, 563, 674
, Ammonia for	...	546, 665
, Analyses of	... 76	
, Fertilisers for	... 110	
in Ceylon	...	481, 494
,, Mysore	... 86	
,, Nyasaland	...	663
Seed and ants	... 189	
, Tapping of	... 86, 288	397, 515, 563,
		641, 658
, Yields from	... 288	
Central Travancore P. A.	... 23	337, 447, 517
Annual Meeting	... 23, 165	
Central Travancore Roads	... 24, 166	
, Tour in, Sc. O's	...	531
Ceylon Planters' Association	... 57, 226	333
Annual Report	... 57	

	VOL. V/1.	VOL. V/2.
	PAGE.	PAGE.
Ceylon Thirty Committee ...	226	
, free Port for Indian Tea ...		343
, Green Bug in ...	61	
, Import Duty on Tea ...		349, 378, 441,
Labour, Report of Commr., 1909. ...	192	455, 485, 500, 519, 672
, Research Chemist for ...	121	
, Royal Botanic Gardens ...		396
, Rubber in ...	60	481, 494
Chaktesappu ...	113, 173, 245	
Chironomus ceylanicus ...	208	
Choukate ...	5, 152	
Cinchona ...	118, 161, 163, 197, 220, 239, 285	349, 353, 376, 386, 473
Clean Weeding ...	163	481, 540
and Cover Crops ...	278	445
and Rubber ...	105	540
and Tephrosia ...	267	
Coagulation of Para Latex ...		687
Cochin Planters' Association ...	221, 233, 269	339, 458, 461
Cochin-China, Rubber in ...		526
Cochin, Report of a Tour in ...	174	501
, Rubber in ...	186	
Coffee , Basic Superphosphate for ...		325
, Black Rot ...		368, 563, 680
, Brazil ...	99	552, 642
, Cess ...	2, 119, 143, 264	348, 371, 378 464, 479, 523, 584
, Curing ...	156	349, 378, 417, 550, 594, 634 650, 667, 679
, Cultivation in Java ...		526
in West Indies ...		547
, Deterioration of ...	227	550
, Disease (Phthora vastatrix) ...	200	
, Disease in Tonkin ...	75	
, Green Bug on ...	242, 275, 287, 300	
, Hybridisation of ...	126, 149	362, 377, 478,
in Plant Breeding ...	155 198, 241	561, 594 580
Industry of Spanish America ...		601
, Manurial Scheme for, ...		335
, Manuring in Guatemala ...		424
Over a century ago ...		685
, Porto Rico ...	200	
Production and Consumption ...		329
Production in India ...		414
, Production of World ...	128	
Quality of and Liqueuring ...		599, 641 684
Robusta ...	182, 251	449, 466

	VOL. V/1.	VOL. V/2.
	PAGE.	PAGE.
Coffee, Russian ...	136	
Samples ...	125, 137	
Scale: Insects affecting ...	222, 234, 247	561
Seeds ...		609, 649
, Selection ...	6	562
, Stump Rot in ...	44	550, 562, 681
, Thefts of ...		535
Trade of Havre ...		331
Valorization ...	40	
Varieties ...		418
Colletotrichum Camelliae ...		531
Colombo Lake Fly ...	208	
Colour of Pará Rubber ...	244	
Conorhinus rubrofasciatus ...	208	
Consideration in the Treatment of Plant Diseases ...		438
Control of Scale Insects ...	213	531, 561, 577
do in the British West Indies by means of Fungoid Parasites ...		571, 587
Control of Imports of Plants ...		497, 504, 549
Coorg Planters' Association ...	145	314, 522
Coorg Girdler Beetle ...	283	
, Planting products in ...		676
, Report of a Tour in ...	3	561
, Roads ...	146	
Correspondence— ...		
Clean Weeding ...		540
Crotalaria Striata ...	97	566
Crude Oil Emulsion ...	299	318
Deterioration of Coffee ...	227	387
Germination of Manihot Rubber seeds ...		641
Green Bug on Coffee ...	275, 287, 300	409
Growth and Colour of Pará Rubber ...	244	
Growth of Pará Rubber ...	205	
Horticultural Gambling ...		399
Hybridisation of Coffee ...	155	342
Indian Tea and its rivals ...		493
Insecticides ...	227	
Insolvency of Messrs. Arbuthnot & Co... ..		409
Labour ...		455
National Bank of India, Ltd. ...		455
New Manihot Rubbers ...		480, 526
Planting Politics ...	275	
Quality of Coffee and Liquoring ...		641, 684
Rinderpest ...		409
Rubber Seed ...		399
Tapping Ceará Rubber ...		641, 658
in Ceylon ...		397
in Mysore ...	86	
Tephrosia purpurea ...	286	
U. P. A. S. I. Labour Committee ...		629
Corticium Javanicum ...	140, 174, 210, 250, 290	501, 563
Cover Crops and Clean Weeding ...	186, 278	445, 551

INDEX.

v

	VOL. V/1.	VOL. V/2.
	PAGE.	PAGE.
Cover Crops and Green Manuring	...	431
and Wash	297	
Crotalaria striata	97, 155, 162	566
nana	152	487, 531
quinquefolia	5, 152	406
retusa	152	
Crude Oil Emulsion	67, 261, 299	474
Cultivation and Manuring	5	"
, Harmful Effect of Grass on...	31	
, Rubber	35	
, " in Bolivia	265	
in Burma		459
in Cochin-China		526
Tea	278	
, Tea, Soil		673
Dactilopius citri	235	
Dadap as Green Dressings	273	
Desmodium triflorum	152	
Deterioration of Coffee	227	550
Die Back Disease of Rubber	140, 176	
Discoloured Pará Biscuits	201	
Dispersion, vitality, and germination of seeds		610
Distribution of Scale Insects	235	
Doctor, European, in Mundakayam	131, 203	327, 503, 538
in Central Travancore..		448, 518
Dragon Flies	140	
Duty, British on Tea	12, 50	343, 632
Ceylon Import . . . on Tea		349, 378, 441,
		458, 485, 500,
		519, 593, 672
Dutch . . . on Tea	49	
French . . . on Tea	191	
Indian . . . on Tea	29, 119	
Eastern Rubber Planting Interests	111	
Ecanda Rubber	120	
Elephant pits	298	
Emigration and Recruiting		464, 498, 520
Enemies, Natural, of Scale Insects	248	
Entomological Notes	206	
Euphorbia clastica	73	
European Doctor in Central Travancore		448, 518
in Mundakayam	131, 203	327, 503, 538
Exhibition, International Rubber	51, 103	313, 328, 371,
		380, 394, 418,
		441, 457, 499,
		514, 519, 524,
		525, 529, 537,
		545, 578, 623,
		639, 678
Exhibition of Products, U. P. A. S. I.		326, 333, 351,
		382, 393, 430
Experiments, Pepper		326
Experiment Plots & Manuring		359, 373, 376,
		519, 534, 585

	VOL. V/1. PAGE.	VOL. V/2. PAGE.
Experiment Tapping of Pará Rubber	...	425
Extradition	...	326, 376, 537, 624
Fasciation in Rubber trees	... 266	
F. M. S. Rubber Conference	... 214	
Fees for Soil Analyses	...	612
Felspar	... 297	
Ferrous Sulphate	... 116	
Fertilisers	...	316
Fertiliser Analyses, How to use	... 69	
Fertiliser, Nitrogen as a	... 100	
Fertilisers. Application of	... 116	
, Phosphoric	... 54, 97	
, Potassic	...	444
, Railage and	... 178	
, Tea	... 150	
, Young Rubber	...	395
Fertilising Influence of Sunlight	... 114, 128	
Fertility of Pollen	...	406
of Soil	...	543, 553
Ficus elastica	... 120	
Fish Manure	... 7	666
Flies	... 44, 67	
Flour Phosphates	... 81	
Foreign Tea in India	... 95	
Fomes semitostus	...	433, 643
Formaline	... 154	
Formosa Tea	...	408
Freights and Coffee Curing	...	349
Rail . . . on Tea	... 19	
French Import Duty on Tea	... 191	
Fruit Tree Weevil	... 273	
Fungicides	... 229	571
, Internal Application of	... 291	
Fungoid Diseases of Garden Plants	... 87	
Fungus for Green Bug	...	406
Fungus and Insect Depradation	...	404
Funtumia elastica	... 120	336
Garden Plants, Fungoid Diseases of	... 87	
Germination of Hevea Seed	... 109	
Manihot Seed	...	641, 677
Girdler Beetle, Coorg	... 283	
Girth, Tappable, of Rubber	... 214	
Gloeosporium allorubrum	... 140, 176	
Government purchases of Cinchona	...	349, 376, 473
Grafting and Budding Tape	... 261	
Grass, Harmful Effect of, in Cultivation	... 31	
Green Bug,	... 144, 223, 242, 270, 275, 287, 300	367, 396 409
Fungus for	...	
in Ceylon	... 61	
on Tea	... 206	
, Wash for	... 33	
Green Dressing	... 186	398, 487, 666.

INDEX.

vii

	VOL. V/1.	VOL. V/2.
	PAGE.	PAGE.
Green Dressing and Wash ...	297	
, Dadap as ...	273	
, Passiflora as ...	237	
, When to Cut ...		421
Green Manuring and the use of Cover Crops...		431
Green Mealy Scale ...	207, 234	
Green Tea ...	11, 59, 196	
, Bonus on ...	101, 109, 154, 166, 239	378, 463, 499, 514, 519
Grenier's Rubber News ...		547, 649
Grevillea robusta and Stump Rot ...	56	
, Gum ...	91	
, Scale ...	224	
Growth of Pará Rubber ...	205	
Growth and Colour of Pará Rubber ...	244	565
Guano for Rubber Trees ...		320
Gwalior Commercial Journal ...		595
Hard Shell Seeds ...	17	
Hariali Grass ...	71	
Harmful Effect of Grass in Cultivation ...	31	
Healthy Plants, Importance of ...	213	
Heat, effect of . . . on Soil ...		608
Helopeltis theivora ...	170, 181, 187	657
Hemilecanium imbricans ...	185	
Henaratgoda Experiments of Rubber ...		467
Herbarium Specimens ...		321, 357
Hidebound Trees ...		532
Horse Flies ...	283	
Horticultural Show, at Singapore ...		309, 333
" Gambling ...		399
Hospitals ...	8, 22, 118, 179	
How to Cultivate a Tea Estate ...	278	
How to Use Fertiliser Analyses ...	69	
Humus ...		323
Hurricanes, Effect of ...		515
Hybridisation in Plant Breeding, Rôle of... of Coffee ...	126, 149, 155, 198, 241	362, 377, 478, 501, 594
Hydro-Electric Project, Bombay ...		609
Imperial Bar Soap ...	182	
Imperial Preferential Tariff ...		379
Importance of Healthy Plants ...	213	
Imports of Plants, Control of ...		497, 504
Imports, Tea ...	85	
Improved Wheat ...		583
Inch of Rain, An ...	140	
Indian Institute of Science ...		677
Indian Tea Association, (Calcutta) ...	26, 50, 92, 110, 183, 191, 202	316, 492, 600, 640, 657, 683
Annual Meeting ...	92	
Scientific Department ...	12, 26, 96, 183	
Indian Tea Association, (London) ...	12, 26, 91	
Indian Tea Cess Committee ...	82	422

		VOL. V/1.	VOL. V/2.
		PAGE.	PAGE.
Indian Tea and its Rivals	...		400, 493, 513
Indian Tea Duty	...	29, 119	349
" , Ceylon a free Port for	...		343
" in America	...		423
Europe	...		422
India	...		422
United Kingdom	...		423
Influence of Sunlight, Fertilising	...	114, 128	
Insect and Fungus Depredations	...		404
Insecticide, Lead Chromate as an	...	79	
International Rubber and Allied			
Trades Exhibition	...	51, 103	313, 328, 371, 380, 394, 418, 441, 457, 499, 514, 519, 524, 525, 529, 537, 543, 578, 623, 639, 678
Insecticides	...	227	
, and Sprayers	...	258	
Ipomoea vitifolia	...	152	
Iron as Plant food	...	116	
Java, Coffee Culture in . . . , Revival of...	...		527
Java Rubber	...		675
Java Tea,	...		673
, in America	...		400.
, Exports	...	265	
Jack Tree Rubber	...	78	
Kerosene Emulsion	...		657
King Edward VII Memorial Fund	...		326, 360, 376, 446, 448, 455, 461, 462, 519, 522, 656
Laboratory for the Scientific Officer	... 185, 197, 209, 240, 264, 293		353, 361, 377, 464, 478, 491, 519, 524, 534, 538, 639
Labour Matters	...2, 19, 22, 26, 47, 117, 119		324, 328, 338, 341, 349, 354, 371, 380, 455, 463, 517, 520, 523, 524, 623, 626, 633
, Report of Ceylon Commission, 1909	...	192	
Lack of Uniformity in the Soil	...		583
Lady-Birds	...	116	532
Land Grants in Anamalais	...	284	
Lantana	...		676
Late King-Emperor	...	225, 257, 263	345, 346
Latex Cups	...		283
Lead Chromate as an Insecticide	...	79	
Leaf Disease, Black Rot of Coffee	...	16	
Leases, Anamalais	...	9, 117, 119	
Lecanium formicarii	...	224	

INDEX.

ix

	VOL. V/1.	VOL. V/2.
	PAGE.	PAGE.
Lecanium Genus	...	7
Lecanium hemisphaericum	...	224
imbricans	... 4, 7, 185,	224
marsupiale	...	7
nigrum	...	178
oleæ	...	372
viride	...33, 61, 144, 206,	
	223, 242, 270, 275,	
	287, 300	396, 409
Lectures, Scientific Officer's	...48, 167, 198, 241	364, 366, 549
, Tea	...	98
Legislative Council of Fort St. George	...	347
Leguminous Plants	... 15, 29, 73, 89,	321, 357, 384,
	113, 152, 213,	395, 487, 530,
		531, 551, 563,
		566, 610
Leptocrisa acuta	...	207
Liberia, Rubber in	...	269
Life History of Scale Insects	...	221
Lime, Magnesia in	...	68
, Manufacture of	...	474, 475
Liquor Passes	...	2
Liquor Shops	...	347
Magnesia in Lime	...	71
Maistries & Coolies Agreements, Stamped papers for	...	315
Making of Soil	...	332
Malabar Coast P. A.	... 221, 233, 269	339, 458, 461
Malay, Rubber Plantations in	...	302
Mangalore-Arsikere Railway	...	369, 633
Manihot Glaziovii	... 6, 71, 199	
, Analyses of	...	76
, Fertilisers for	...	110
, Tapping of	... 86, 288	
varieties	...	395, 402, 480,
		493, 526
Mannans Creek Bridge	...	337
Manufacture of Lime	...	474, 475
Rubber	...	187
Manure, Cattle	...	42
, Fish	...	7
, Sheep	...	7
Manures, Acid and Alkaline	...	273
Application of	... 116, 285	
Rubber	... 169, 187	
Manurial Scheme for Coffee, A	...	335
Manuring	...	168
and Cultivation	...	5
, Green & the use of Cover Crops	...	431
of Rubber	...	187
of Coffee in Guatemala	...	424
and Experiment Plots	...	359, 373, 376,
		519, 534, 585
Mariaella dussumierii	...	129
Market. New York Tea	...	39

	VOL. V/1.	VOL. V/2.
	PAGE.	PAGE.
Mass Meeting, Labour	...	2
Mealy Bug Scale	...	3, 207, 235
, Green	...	234
Means of distribution of Scale Insects	...	235
Medical Matters	...	24, 143
Mendel's Law	...	138
Miniature Exhibition	...	580
		326, 333, 351,
		382, 393, 430
Mistletoes	...	17
Mole Crickets	...	91, 129
Monstera deliciosa	...	
Mosquito Blight	...	583
Motor Transport	...	531, 657
Mucuna Lyoni	...	21
pruriens	...	15
Mulches	...	41, 159
Mundakayam Planters' Association	...	407
Annual Meeting	...	130, 203
, Tour in	...	327, 503, 535
Mylocerus discolor	...	515
Nandi Rubber	...	273
Natural Enemies of Scale Insects	...	606
New-Rubber-yielding Plants	...	248
New-York Market, Tea	...	296
Nilgiri Lady Birds	...	39
Nilgiri Planters' Association	...	116
Annual Meeting	...	532
, Potatoes in the	...	190, 238
, Tour in the	...	238
Nitro-Bacterian, Experiments with	...	66, 102
Nitrogen as a Fertiliser	...	270
Nitrolim	...	206
Non-Service of Warrants	...	100
	...	240, 262
		366, 385, 612
		326, 328, 381,
		462, 479, 498,
		530, 533, 539,
		624
North Mysore Planters' Association	...	144, 263
Annual Meeting	...	144
Notes and Comments by the Scientific Officer	...	
1. Fish Manure	...	7
2. Sheep Manure	...	7
3. Lecanium imbricans	...	7
4. Lecanium Genus	...	7
5. Hard Shell Seeds	...	17
6. Mistletoes	...	17
7. Wash for Green Bug	...	33
8. Flies	...	44
9. Stump Rot in Coffee	...	44
10. Stump Rot in Tea	...	56
11. Trenches and Renovation Pits	...	56
12. Hariali Grass	...	71
13. Magnesia in Lime	...	71
14. Tar for Pruning Cuts	...	71
15. Basic Slag	...	81

VOL. V/1.

VOL. V/2.

PAGE.

PAGE.

Notes and Comments—(Continued).

16. Bordeaux Mixture	...	81
17. Flour Phosphates	...	81
18. Mole Crickets	...	91
19. Silver Oak Gum	...	91
20. Soil Analyses	...	106
21. Castilloa Rubber	...	106
22. Application of Fertilisers	...	116
23. Ferrous Sulphate	...	116
24. Iron as Plant Food	...	116
35. Lady Birds	...	116
26. Mole Cricket or Slug	...	129
27. Basic Superphosphate	...	129
28. Disease of Pará Rubber	...	140
29. Dragon Flies	...	140
30. An Inch of Rain	...	140
31. Plants named	...	152
32. Railage and Fertilisers	...	178
33. Scales on Pará Rubber	...	178
34. Basic Superphosphate	...	189
35. Ceará seed and Ants	...	189
36. Discolouration of Pará Biscuits	...	201
37. Tephrosia purpurea	...	213
38. Soda as Plant food	...	213
39. Control of Scale Insects	...	213
40. Importance of Healthy Plants	...	213
41. Spread of Scale Insects	...	237
42. Passiflora as a Green Dressing	...	237
43. Pink Fungus and Bordeaux Mixture..	...	250
44. Sulphate of Copper	...	250
45. Rubbing Tapping Systems	...	261
46. Grafting and Budding Tape	...	261
47. Crude Oil Emulsion	...	261
48. Dadap as a Green Dressing	...	273
49. Acid and Alkaline Manures	...	273
40. Weevil on Fruit Trees	...	273
51. Coorg Girdler Beetle	...	283
52. Latex Cups	...	283
53. Horse Flies	...	283
54. Felspar	...	297
55. Cover Crops and Wash	...	297
56. Sprayer for Cattle	...	297
57. Stump Rot in Tea	...	313
58. Atylosia Candollei	...	325
59. Basic Superphosphate for Coffee	...	325
60. A new Scale Insect	...	372
61. Stump Rot in Tea	...	372
62. Basic Superphosphate	...	372
63. Mating Rubber Varieties	...	395
64. Fertilisers for Young Rubber	...	395
65. Legumes of Leguminous Plants..	...	395
66. Feeding of Pollen	...	406
67. Coccinea quinquifolia	...	406
68. Fertiliser for Green Bug	...	406

	VOL. V/1.	VOL. V/2
	PAGE.	PAGE.
Notes and Comments—(Continued).		
69. Green Dressings—When to Cut? ...		421
70. Lime ...		474
71. Crude Oil Emulsion ...		474
72. Canker on Pará Rubber ...		516
73. Nilgiri Lady Birds ...		532
74. Hidebound Trees ...		532
75. Root Disease of Hevea ...		546
76. Ammonia for Ceará ...		546
77. Growth of Pará Rubber ...		565
78. Porcupines and Rubber ...		565
79. Seed of Tephrosia purpurca ...		565
80. Lack of Uniformity in the Soil ...		583
81. Improved Wheat ...		583
82. Monstera deliciosa ...		583
83. Quality of Coffee and Liquoring ...		599
84. Ant Extermination ...		599
85. Soil Analyses—Mr. Kelway Bamber's Fees ...		612
86. Nitrolim in Queensland ...		612
87. Green Dressings ...		666
88. Scale Insects on Pepper ...		666
89. Fish Manure ...		666
Number of Plants per acre ...		665
Oil from Rubber Seed ...		461, 682
Paddy Fly ...	208	
Palo Amarillo Rubber ...	73	
Panalur Bridge ...	45, 298	
Pará Rubber, Analyses of ...	78	
, Biscuits Discoloured ...	201	
, Canker on ...		516
Coagulation of Latex... ..		687
, Coffee Robusta as a Catch Crop for ...		466
, Experimental Tapping of ...		425
, Growth of ...	205	433
, Growth and Colour of ...	244	565
in Nysaland ...		663
oil from seed ...		682
from Old Trees ...	269	
, Plantation v. Fine ...	2, 17	583, 656
Preparation of ...	246	
, Scale on ...	178	
, Yield of ...		433
Parasites, Animal, and Disease ...	74	
Part played by Micro-Organisms in the Soil.		596
Passiflora as a Green Dressing ...	237	
Pepper Experiments ...		326
Pepper Passes ...		315
Pepper, Scale Insects on ...		666
Stealing ...	20	
Pepper Vine Disease ...6, 13, 18, 21, 255		348, 353, 376, 463, 488, 522, 551
Peradeniya Bulletins ...	173	
Persia, Tea in ...	74	

INDEX.

xiii

	VOL. V/1. PAGE.	VOL. V/2. PAGE.
Pest Act		348, 371, 379, 398, 463, 473, 479, 519, 535 367
Pests and Diseases		
Pests of Tea	... 202	
Phosphates, Flour	... 81	
Phosphatic Fertilisers	... 54, 97	
Phosphorus	... 285	
Phthora vastatrix	... 200	
Pink Disease	... 140, 174, 290	501, 583
and Bordeaux Mixture	... 210, 250	
Plant Diseases, Considerations in the treatment of		438
Plants, number of per acre	...	665
Planters' Addresses, A register of	...	393
Planters' Benevolent Fund	...8, 107, 143, 144, ... 221, 233, 257, 264, 269, 298	314, 322, 334, 338, 341, 351, 354, 371, 381, 405, 430, 448, 520, 523, 534, 539, 593 309, 350, 354, 357, 405, 429, 523, 539 459, 547
Planters' Chronicle	... 1, 30, 125, 169, 199, 233,	
Planters' Library	...	
Planters' Papers—		
1. One Aspect of the Effect of Mulching on the Mechanical condition of the Soil.		407
2. Lime	...	475
3. Curing of Coffee	...	634, 650, 667
Plantation Rubber, in Malay	... 302	656
Plant Breeding, Rôle of Hybridisation in...		580
Plant Food, Iron as	... 116	
Soda as	... 213	
Planting Interests, Eastern Rubber	... 111	
Planting Member, Work of	...	355
Politics	... 275	
Plants, Garden, Fungoid Diseases of	... 87	
, Importance of Healthy	... 213	
, Rest period in	...	544
Plumerias	... 266	
Police matters	... 9, 19, 107, 109, 146	594, 623
Pollen, Fertility of	...	406
Poonacs	...	681
Porto Rico Coffee	... 200	
Postal Matters	...	326, 464
Potassic Fertilisers	...	444
Potatoes in the Nilgiris	... 66, 102	
Preferential Tariff, Imperial	...	379
Pruning Cuts, Tar for	... 65, 71	
Production of Coffee in India	...	414
" of Tea in India	...	410
Publications	...	350, 429, 448, 457, 473, 537

	Vol. V/I. PAGE.	Vol. V/2. PAGE.
Quality of Coffee & Liquoring ...		599, 641
Quality of Tea Dust ...	28	
Railage and Fertilisers ...	178	
Rail Freights on Tea ...	19	
Rain, An Inch of ...	140	
Raphionacme utilis ...	140	
Rational Bleeding of Hevea Rubber ...		568
Reassessment of Lands in Travancore ...	46	
Recruiting and Emigration ...		464, 539, 584
Renard Road Train ...	10, 41, 145,	
Renewal, Bark ...	217	
Renovation Pits and Trenches ...	56	
Report, Ceylon Labour Commission ...	192	
, Sc. O. Annual 1909-10. ...		357, 364, 366
Tour in Central Travancore ...		531
Tour in Cochin ...	174, 186	501
Tour in Coorg ...	3	561
Tour in Mundakayam ...		515
Tour in S. Mysore ...		679
Tour in Travancore ...	174, 186	
Tour in Wynaad ...		487
Research Chemist, Ceylon ...	121	
Rest Period in Plants ...		544
Resurvey of Anamalais ...	9	
Revival of Coffee Culture in Java ...		526
Rinderpest ...	20, 146	315, 409,
Roads and Communications ...	8, 19, 21, 24, 45, 118, 132, 146, 153, 166	314, 327, 328, 337, 338, 341, 348, 354, 369, 377, 446, 457, 462, 521, 525, 538, 584, 672, 580
Rôle of Hybridisation in Plant Breeding ...		
Rubber , Analyses of ...	76, 78	
, Bleeding, Rational, of Hevea ...		568
, Books on ...	34	547
Boom ...	112	
Boxes ...	249	
, Brazil ...		645
, Cranker on ...		516
, Castilloa ...	106, 120	310, 390, 448, 603
, Ceará ...	6, 71, 76, 86, 110, 199, 288	397, 481, 494, 546, 551, 563, 641, 658, 663, 674
, Ceylon ...	60	481, 494
, Clean Weeding ...	105	540
, Coagulation of Pará...Latex ...		687
, Cochin and North Travancore... ..	174, 186	
Conference, F. M. S. ...	214	
Cultivation in Bolivia ...	265	664
in Burma ...		459
in Cochin-China ...		526

INDEX.

xv

	VOL. V/1.	VOL. V/2.
	PAGE.	PAGE.
Rubber, Cultivation of Hevea Brasiliensis		433
Culture	35	648
Curing and Tapping	...	661
Diseases	140, 174, 176, 186	546, 643.
Disinfection of Rubber Seeds	...	643
, Eastern Planting Interests	111	
, Ecanda	120	
, Fasciation of	266	
in Formosa	...	336
, Fertilisers for young	...	395
Growers' Association	121	
, Growth of	205	
, Growth and Colour of	244	
, Guano for . . . trees	...	320
, Henaratgoda Experiments	...	467
, Industry, Bahia	...	318
in Java	...	675
, International . . . and Allied		
Trades Exhibition...	51, 103	313, 328, 371. 380, 394, 418. 441, 457, 499. 514, 519, 524. 525, 537, 545, 578, 623, 639, 678
, Jack Tree	78	
, Liberia	266	
, Manihot varieties	...	395, 396, 402. 480, 493, 526, 641
, Manures for	169, 187	
, Old Trees, . . . from	269	
, Palo Amarillo	73	
, Pink Disease	140, 174, 210, 250, 290	501, 563
, Plantations v. Fine	2, 17	
Plantations, Malay,	302	
and Porcupines	...	565
, Preparation of	246	
, Rational Bleeding of Hevea	...	568
, Renewal of Bark	217	
Scale on	178	
Seed, Oil from	11	461, 682
, South Indian	...	352, 364
, Strength of	70	
Substitutes	259	
, Tapping of	86, 214, 217, 261, 288	397, 425, 448, 477, 515, 563, 604, 641, 658, 661
Thefts of	...	328
Varieties of	...	403
, Weeds on . . . Estates	51	

	VOL. V/1.	VOL. V/2.
	PAGE.	PAGE.
Rubber, Wynaad ...	101	
, Yield of	215	433
-yielding plants, new	296	
Russia, Coffee in ...	136	
, Tea in	73, 136	
Scale Insects ...	185, 224, 234, 240, 247	666
, affecting Coffee Estates	222, 234, 247	466
and Ants	236	
Control of	213	531, 561, 571, 577
, Life History of	222	
, Mealy Bug	3, 207, 234, 235	
, Means of Distribution	235	
, Natural Enemies of	248	
on Para Rubber	178	
„ Pepper		666
, Remedies for	213, 223, 224, 234, 235, 247	
, Silver Oak	224	
, Spread of	237	
Scientific Department ...		533, 577, 617, 629, 656
Scientific Officer ...	2, 30, 53, 77, 96, 113, 125, 137, 149, 221, 233, 245,	347, 376, 405, 418, 457, 473, 485, 513, 529, 533, 665
Assistant to		533, 577, 617, 629, 656
Fund		314, 326, 340, 533, 536, 609, 617, 639
Laboratory for	185, 197, 209, 240, 264, 293	353, 361, 377, 464, 478, 491, 519, 524, 534, 538, 639
Lectures	47, 167, 198, 241	549
Programme		491
Report, Annual, 1909-10.		357, 364, 366
Tours		358
Scientific Officer's Papers.		
XIII. Report on a Tour in Coorg	3	
XIV. Black Rot Leaf Disease of Coffee	16	
XV. Harmful Effect of Grass on Cultivation	31	
XVI. Cattle Manure	42	
XVII. Phosphatic Fertilisers	54, 97	
XVIII. How to use Fertiliser Analyses.	69	
XIX. Weeds	80	
XX. Leguminous Plants	89	
XXI. Rubber and Clean Weeding	105	
XXII. The Fertilising Influence of Sunlight	114, 128	
XXIII. Hybridisation of Coffee	126	
XXIV. Mendel's Law	138	

I N D E X.

xvii

	Vol. V/1. PAGE.	Vol. V/2. PAGE.
XXV. Fertilisers for Tea ...	150	
XXVI. Clean Weeding ...	163	
XXVII. Report on a Tour in Cochin and Travancore ...	174, 186	
XXVIII. Lecture at Yercaud ...	198	
XXIX. Pink Disease of Pará Rubber and Bordeaux Mixture ...	210	
XXX. Scale Insects affecting Coffee Estates ...	222, 234, 247	
XXXI. Rubber Substitutes ...	259	
XXXII. Tour in the Nilgiris ...	270	
XXXIII. Cattle Ticks ...	281	
XXXIV. New Rubber-yielding Plants ...	296	
XXXV. Castilloa Rubber ...		310
XXXVI. Humus ...		323
XXXVII. A Manurial Scheme for Coffee...		335
XXXVIII. Nitrolim ...		385
XXXIX. Soil Analyses ...		419
XL. Green Manuring and the Use of Cover Crops ...		431
XLI. Potassic Fertilisers ...		444
XLII. Second Tour in Wynaad ...		487
XLIII. Second Tour in Cochin ...		501
XLIV. Second Tour in Mundakayam...		515
XLV. Second Tour in Central Travancore		531
XLVI. Second Tour in Coorg ...		561
XLVII. The Rôle of Hybridisation in Plant Breeding ...		580
XLVIII. The Part played by Mycro- organisms in the Soil ...		596
XLIX. Dispersion, Vitality and Germi- nation of Seeds ...		610
L. Tour in South Mysore ...		679
Seed, Ceará . . . and Ants ...	189	
, Dispersion, Vitality and Germination of		610
, Hard Shell ...	17	
, Pará, Germination of ...	109	
, Rubber ...		399
Selection, Rubber ...		562
, Tephrosia purpurea ...		565
Selected Cuttings—		
Balance of Life in the Soil ...	134, 147	
Blister Blight on Tea ...	303	
Changes in the Soil and its Fertility ...		391
Clean Weeding v. Tephrosia ...	267	
Coffee Robusta ...	251	
Considerations in the Treatment of Plant Diseases ...		438
Causes of Soil Fertility ...		553
Control of Scale Insects in the British West Indies by means of Fungoid Parasites ...		571, 587
Fertility of Soil ...		543
Fungi in relation to Agriculture ...		319

	VOL. V/1.	VOL. V/2.
	PAGE.	PAGE.
Selected Cuttings---(Continued).		
Fungicides	229	
Fungoid Diseases of Garden Plants	87	
Further Experiments with Nitro-		
Bacterine at Wisley	206	
How to Cultivate a Tea Estate	278	
Insect and Fungus Depredations		404
The Internal Application of Fungicides	291	
Mulch	159	
Nitrogen as a Fertiliser	100	
Sterilisation of Soil	122	
Wilt Diseases of Pepper	255	
Sesbania aculeata	152	
aegyptiaca	152	
Sheep Manure	7	
Shevaroy Planters' Association	107, 153, 190, 274	446, 517, 585, 656, 445
Annual Meeting		
Silver Oak Gum	91	
Scale	224	
Smother Plants	15	
Soap, Bengal Bar	182	
, Imperial Bar	182	
Soda as Plant food	213	
Soil Analyses	106	419, 514
Bacteria	41	
, Balance of Life in		583
Cultivation of Tea Soil		673
, Fees for Soil Analyses		612
, Lack of Uniformity in		583
, Making of . . .		332
, Changes in the . . . and its fertility		391, 543, 553
, Part played by Micro-organisms in...		596
, Effect of Heat on		608
, Sterilization	122, 147	
South Indian Tea	64	
South Mysore Planters' Association	22, 141, 225	613
Annual Meeting	141	
South Travancore P. A.	45, 154, 298	490, 639
Annual Report	45	
Sprayer for Cattle	297	
Sprayers and Insecticides	258	321
Spread of Scale Insects	237	
Stamped Papers, Maistries and Coolies' Agreement	315	
Sthenias grisator	283	
Standard Weights		326
Strength of Rubber	70	
Sterilization of Soil	122, 147	
Sticholotis andreae		532
Sri Mulam Delegate's Report	203	
Popular Assembly		639
Stump Rot	5	
in Coffee	44	550, 562, 681
in Tea	56, 62	313, 372

INDEX.

xix

	VOL. V/1.	VOL. V/2.
	PAGE.	PAGE.
Substitutes for Rubber	259	
Sulphate of Copper	250	
Sunlight. Fertilising Influence of	114, 128	
Superphosphate	54	
Basic	139, 189	
Syringe, Abol	321	
Systems of Rubber Tapping	214, 261	
Tape, Grafting and Budding	261	
Tapioca	182	
Tapping Castilloa Rubber		448, 477
Ceará Rubber	86, 288	397, 515, 568,
		641, 658
Pará Rubber		425
Tar for Pruning Cuts	65, 71	
Tariff, Imperial Preferential		379
Tea, Advertising in America	82	
, Blister Blight	27, 110, 303	
, British Trade	64	
, Brown Blight		531
, Burma	27	
, China		630
Cess Committee, Indian	58	
, Ceylon	187	
, China Tea in London		659
, Cochin and North Travancore		
Cultivation of Tea Soil		673
Diseases	187, 272	
Dust	50	
Dust, Quality	28	
Duty, British	12, 50	343, 632
, Ceylon		349, 378, 441,
		458, 485, 500,
		519, 593, 672
, Dutch	49	
, French Import	191	
, Indian	29, 112	349
Estate, How to Cultivate	278	
Exports, Java	265	
, Fertilisers for	150	
, Foreign in India	95	
, Formosa		408
, Green	11, 59, 196	
, Bonus on	101, 109, 154,	378, 463, 499,
	166, 239	514, 519
, Green Bug on	206	396
Tea, Imports of	85	
, Indian . . . and its Rivals		400, 493, 513
, Indian . . . in America		423
, " . . . in Europe		422
, " . . . in India		422
, " . . . in the United Kingdom.		423
, in Java		673
, Java, in America		400
, Lecture on	98	

	VOL. V/1.	VOL. V/2.
	PAGE.	PAGE.
Tea, Mosquito Blight ...	170, 181, 187	531, 657
, New York Market, 1909 ...	39	
, Persian ...	74	
, Pests of ...	202	
Production of . . . in India ...		410
, Rail Freights on ...	19	
Seed, Disinfection of ...	154	
Soil, Cultivation of ...		673
, South Indian ...	64	352
, and Speculation ...		514
, Stump Rot ...	56, 62	313, 372
Thefts ...	20	327, 341, 349
Trade ...	133	
Worm-eaten . . . Chests ...		630
Telegrams ...	10	348
Tephrosia candida ...	155, 207, 235	
Hookeriana ...	155	
purpurea ...	29, 152, 213, 221, 257, 267	530, 551, 565, 610
tinctoria ...	286	
tinctoria ...	152	487, 488
Termes gestroi ...	28	
Theni Bridge ...	166	337, 354, 377
Thirty Committee, Ceylon ...	226	
Ticks, Cattle ...	281	
Tonkin, Coffee Diseases in ...	75	
Tour in Cochín and Travancore, Sc. O's ...	174, 186	501, 531
Coorg ...	3	561
Mundakayam ...		515
Nilgiris ...	270	
S. Mysore ...		679
Wynaad ...		487
Tours, Sc. O's ...		358
Travancore, Reassessment of lands in ...	46	
Treatment of Plant Diseases, Considerations in ...		438
Trenches and Renovation Pits ...	56	
Tridax procumbens ...	152	
Tsamba ...	232	
U. P. A. S. I. ...	1, 29, 41, 53, 58, 65, 77, 101, 113, 125, 137, 149, 161, 173, 185, 209, 221, 233, 240, 245, 257, 269, 293	309, 321, 333, 345, 373, 393, 405, 417, 429, 441, 457, 473, 485, 497, 513, 529, 545, 561, 577, 593, 609, 633, 649, 665, 677
Accounts ...		350, 351, 354, 381
Annual Meeting, 1910 ...		321, 333, 345, 373
Annual Report, 1909-1910... ..		346
Book of Proceedings, 1910... ..		429, 457, 537
Delegates ...		345

INDEX.

xxi

	VOL. V/1.	VOL. V/2.
	PAGE.	PAGE.
Exhibition of Products ...		326, 333, 351, 382, 393, 430
Finances ...		371, 382
Labour Committee ...		455, 629
Memo. of Resolutions ...		376
Office-Bearers 1910-1911 ...		371
Registered Office ...		633
Rules ...		381
Sc. O's Report 1909-1910 ...		357, 364, 366
Vaigay Valley Railway ...		457
Valorization, Coffee ...	40	
Viceroy, Address to ...	23	
Warrants ...	10	
Non-service of ...	240, 262	326, 328, 381, 462, 479, 498, 530, 539, 624
Wash and Cover Crops ...	297	
Wash for Green Bug ...	33	
Weeds ...	80	
Land and Rubber Estates ...	51	445
Weeding, Clean ...	163	487, 540
, v. Tephrosia ...	267	
, and Rubber ...	105	540
Weevil on Fruit Trees ...	273	
Weights and Measures ...		326, 328, 379
West Indies, Coffee Culture in ...		547
Wheat, Improved ...		583
White Ants ...	28	
Wilt Disease of Pepper ...	255	551
World's Coffee Production ...	128	
Wynaad Planters' Association ... 18, 21, 72,	108, 262	326, 462, 538, 584, 672
Annual Meeting ...	18	
, Sc. O's Tour in ...		487
Yields for Ceará with different Tapping Systems ...	288	
Yields of Camphor ...		421
Yercaud, Sc. O's. Lecture at. ...	198	

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"The Planters' Chronicle."

It is proposed to issue *The Planters' Chronicle* once a week in future. The chief object of this change is to enable the Scientific Officer and the Secretary to the U. P. A. S. I. to place information at the disposal of planters without delay; and it is also hoped that District Planters' Associations will be able to dispense with the separate publication of their proceedings that has been customary in the past, referring all planters to this paper for reports of proceedings as well as for other matter of interest to the community.

A NEW SECTION

is started in the current number under the heading "Notes and Comments by the Scientific Officer," and this may be properly introduced with the remark that Mr. Anstead proposes to make it a rule to reply to inquiries from individuals through the medium of this section, thus placing the information given at the disposal of all readers, and economising time that is required for other work. When an inquiry already dealt with is repeated by some other planter, he will be simply referred (by number) to the Note in which the reply is contained. Mr. Anstead has explained personally to a few what he now wishes to be made known to the many, *viz.*, that *The Planters' Chronicle* is the most convenient channel for his communications with those in whose behalf he is working, and that much of his work must either be done over again or must fail to have its full effect unless planters read *The Planters' Chronicle* regularly and keep it by them for ready reference. This statement is made by his special desire.

For the rest, it is hoped that a larger supply of articles and notes relating to planting problems can be placed before readers in the new "weekly" than could be given in the old "monthly;" and further, that planters themselves will see to it that a Correspondence column is opened, in which they may join in the discussion of such problems and of various other subjects. The reply can now be presented quickly after the appearance of the remark or inquiry; and it rests with planters to avail themselves of the opportunity that will be offered them for stating their own opinion and eliciting those of their brethren.

Publication of this first number of the weekly edition has been delayed for a couple of days, and it is possible that the forbearance of readers will have to be claimed in respect to other points in connection with this and the next few issues; but every effort will be made to get the new scheme into full working order as soon as possible.

The Scientific Officer.

Mr. R. D. Anstead proceeds on tour on the 24th instant, travelling from Bangalore to South Travancore. After inspecting estates there he will work his way through Cochin, Mundakayam, Central Travancore, the Cardamom Hills and the Kanan Devan tract. He is likely to be away from headquarters until about the end of February.

Labour Problems.

The Chairman has suggested that a Mass Meeting of planters should be held for the purpose of discussing the labour law. Difficulties are to be expected, but while reference to these has been made from several quarters the consensus of opinion appears to be that the suggestion is a sound one and that good would result if effect could be given to it. That it is not feasible is the belief of one Association, at least; that it would be useless unless really representative, is the view of another. Time alone can show if a Mass Meeting is practicable and if it can be organized in such a manner that it may prove of real utility.

The Proposed Coffee Cess.

A suggestion that the respective Honorary Secretaries of District Planters' Associations should certify before a Magistrate that there is no opposition to the proposed Cess in a particular district, must be discarded. This plan would, it is understood, not be acceptable to Government. Other means of ascertaining the opinion of the community as a whole must be adopted, and efforts are being made to "find a way."

It is perhaps advisable to emphasise the fact that it is not in contemplation to impose a Cess of Coffee, but only one on *Exports of Coffee*. If this is made clear to all producers some present doubts will probably be dissipated.

Plantation v. Fine Para Rubber.

From the following report of the findings of the Scientific Department of the Department of Agriculture it will be seen that the conclusion that is of the most importance to those interested in the industry is the fact that a series of tests on rubber from 4½, 5, 9, 10, 17, and 27 year old trees show very little difference in the strength of the rubber from the trees of various ages, but the fact remains that the potential strength of plantation rubber of any age is inferior to that of fine Pará, and it seems clear that the necessary improvement in the cultivated product can be obtained only through improved method of treatment.

[Report.]

PLANTATION RUBBER (HEVEA BRASILIENSIS.)

First.—The rubber from young trees is not materially different from those of much greater age, and leads us to the conclusion that the age of the tree from which rubber is extracted is not so important as has been generally supposed.

Second.—The potential strength of the plantation product is inferior to that of fine Pará.

Third.—Stretch satisfactory for all practical purposes.

Fourth.—The plantation product has slightly less resin than fine Pará.

Fifth.—The plantation rubber has slightly less mineral matter than fine Pará.

Sixth.—The well-known fact that plantation rubber has from 15 to 18 per cent. less moisture than fine Pará.

Scientific Officer's Papers.**XIII—REPORT ON A TOUR IN COORG.**

Leaving Bangalore on 14th December and returning on 24th, I made a rapid tour in Coorg, my object in this short time being rather to meet planters and discuss with them the agricultural problems of the district, than to make any detailed examination of estates. Thanks to the excellent arrangements made by Mr. R. D. Tipping, the Hony. Secretary of the Coorg Planters' Association, to whom my hearty thanks are due, I was enabled to see a large part of the district, and to attend three meetings of planters, *viz.*, at Pollibetta, Siddapur, and Mercara.

At these meetings the difficulties and possibilities of the district were discussed, and I was able to visit such estates as had special points to show in illustration of the problems brought up.

After such a short tour it is impossible for me to write anything approaching a detailed report, and what follows is only to be regarded in the light of suggestions.

Insect Pests.

The most important insect pest in the district appears to be the Mealy Bug Scale (*Dactylopius citri*) which attacks the roots of the Coffee. This pest is much more deadly in South Coorg than in North Coorg, owing possibly to the difference in elevation, rainfall, and aspect, between the two districts. This scale is quite distinct from the Green Mealy Scale (*Pulvinaria psidii*) which is found on the shade trees, and in some cases on the Coffee beneath them. In the early stages of its existence the latter is a green scale, and has been in one or two instances mistaken for the Pulney Bug (*Lecanium viride*), and great alarm has been felt in consequence. The Pulney Bug, however, is quite a different kind of Scale, and never becomes covered with a white wax, and in each instance to which my attention was called it was a case of young Mealy Scales being mistaken for Pulney Bug.

To return to the Mealy Bug, it as a rule lives at a depth of a few inches in the soil and feeds on the roots, destroying the bark, and causing them to die back so that the young plant will not grow. By far the greater part of the damage done is done to young plants. In his report upon the Insect Pests of Coffee in South India (Department of Agriculture in India, Bulletin No. 2) in 1903, Mr. H. M. Lefroy, the Entomologist to the Government of India, made certain definite recommendations for combating this pest. When these have been systematically and persistently carried out they have proved very beneficial, and I was shown estates where the pest was held in check by this method, and it was possible by its use to raise young trees past the stage at which they suffer from the attacks of the Bug.

It must be borne in mind that for any remedy to be successful it must be persistently and repeatedly carried out, and should not be rejected as useless because it may not appear to be successful at the very first. In the light of what I saw upon Mr. A. H. Jackson's estate at Pollibetta, where Mr. Lefroy's advice had been constantly carried out, I am convinced that no better plan can be recommended. Mr. Lefroy's recommendations were as follows:—

"In the first place, it is necessary to protect the young plants; the soil used for basket plants should be mixed with lime and sulphur, which will deter the bug from attacking the young plants. The proportions used are:—

One basket of finely powdered sulphur.			
Four baskets do.	do.	do.	lime.
Seventy do.	do.	do.	soil.

"It is possible that the proportion of sulphur might be reduced in this mixture, but the above has given satisfactory results. Not only are the young plants protected in the nursery, but when planted out the lime and sulphur in the soil protects them as long as it remains. When the original basket soil becomes covered over with ordinary soil, the bugs will attack the crown of the plant where the ordinary soil lies. Lime and sulphur mixed at the rate of four to one can also be placed round the roots and crown of young plants. It is only necessary to bend the young plant over each way and drop in the powder; about one ounce is sufficient for each plant, and the powder should penetrate as far down into the roots as possible. The powder must also be placed up to the surface; as soon as the soil covers the lime and sulphur, the bug is likely to attack the plant at the crown, the lime and sulphur having only a purely local effect.

"Liquid insecticides have a distinct value in cases where Mealy Bug already infests young plants. Infested plants watered with liquid insecticides become temporarily free of bug; the effect will not last more than a week or so, especially in very wet weather, but many mealy bugs can be destroyed in this way, and this treatment, if supplemented with a dose of lime and sulphur, is effective on young plants infested with the bug; only such insecticides can be used as will not injure the roots of young plants; this practically limits them to two, McDougall's I. and F. wash, and tobacco and soap wash.

"The first may be dissolved at the rate of one gallon to 100 gallons of water; the second is made thus; dissolve 12 lbs. hard soap in hot water; soak 24 lbs. tobacco in 24 gallons cold water for one day, mix the two and make up to 100 gallons with cold water.

"These liquids may be poured down the roots of the young plants, about one-sixth of a pint being sufficient for each plant.

"The above two methods are the simplest and most effective direct methods of checking the bug."

It is especially important to put out young plants free from Mealy Bug, and in districts infested with Bug, basket plants grown in the nursery in a lime sulphur mixture are absolutely necessary. The tobacco wash will be found most useful for checking any attack on plants in the nursery, three applications a year being given. At the time of my visit some Mealy Bug could be found on the shade trees, protected under a mud shelter made by ants. Such colonies should be destroyed by burning them out, and the ant which nurses them should be destroyed whenever its nest can be found in Coffee. The ant in question is a black one which has a habit of turning up its abdomen over its body when it runs and is probably a species of *Cremastogaster*.

A large limpet-like scale is found in some places attacking Noga trees (*Cedrela toona*). This is *Lecanium imbricans* and it produces on the Coffee below it such a thick covering of 'black blight' as to kill it. The black blight is produced by a black fungus which grows in the sweet sticky excreta of the scale which falls on the Coffee, and if the scale is removed the black deposit will also disappear.

The only practical remedy is to cut down, and burn the Noga trees attacked,—replacing them with some shade tree which is not attacked by the scale. In Mysore I found this scale on several species of *Ficus*, as well as on *Cedrela*, which makes it the more important to destroy it wherever it makes its appearance.

Cultivation and Manuring.

The remarks made in my report upon my tour in Mysore apply equally to Coorg, and I would refer planters to the paragraphs upon Mulching, Cultivation, and Manuring in that report. (Sc. O. Papers VIII.)

Once more I recommend the systematic use of Lime, especially on the clay soils of the district. While not a direct fertiliser it manufactures plant food in the soil. The lime procurable in the district no doubt varies in quality from quarry to quarry, and a systematic analytical examination of the lime from the various available sources should be made, in order to determine which is the best. It is important that lime used for agricultural purposes should not contain more than 4% of Magnesia.

I was glad to find that the value of pulp as a fertiliser was fully recognised in the district. The usual practice is to make a compost of the pulp with sweepings from the cooly lines, jungle soil, weeds, &c. Such composts should be made in a pit so that the liquids formed by decomposition cannot drain away and be lost, and in any case a pandal should be erected over the compost heap to protect it from sun and rain. The advantage of preparing cattle manure and composts in covered pits is well brought out by an experiment conducted at the Dumraon Agricultural Station, Bengal, the result of which is published in the annual report for 1908-09. An application of 100 maunds per acre of cow dung stored in pits gave a yield of 26½ maunds of rice grain and 47 maunds of straw as compared with a yield of 15½ maunds of grain and 27½ maunds of straw obtained by the application of the same quantity per acre of cow dung which had been left exposed to sun and rain from the time it had been collected.

It is also important that fertilisers such as nitrates, poonac, bones, &c., should be stored under shelter and not left in heaps exposed to the weather, even though they may be packed in bags.

With regard to green manuring, several useful leguminous plants were found in the local flora. A *Crotalaria* (*C. quinquefolia*) is common, and is worthy of a trial in young coffee. Another useful plant, known locally as "*Choukate*," which grows 3 or 4 feet high, was being used on some estates and supplying a useful mulch when cut over at the beginning of the dry season.

A difficulty is experienced in bringing spaces made by removing plants killed by borer, or mealy bug, back into cultivation. This can be best overcome by lining the soil heavily, or in places infested with mealy bug giving a dressing of sulphur and lime, and then planting secondary shade like "*Choukate*" and *Erythrina lithosperma*, supplemented with a green dressing cover crop such as *Crotalaria quinquefolia*, to establish a mulch.

Stump Rot and Shade Trees.

In some places the shade trees have grown too big and high and are letting in too much light, and doing damage by the drip from their high branches. Such shade should be replaced by a mixture of young shade trees, helped on with *Erythrina lithosperma*. Despite the fact that the *Erythrina* roots are attacked by the Mealy Bug, so that by growing it one is really supplying the bug with a food plant, young coffee comes on so well under its influence that it seems advisable to plant it. The removal of old shade is attended by the danger of Stump rot, which is bad on some estates. A large number of shade trees are known to induce this disease and communicate it to the surrounding coffee, and these should be trenched before they are killed. (See Sc. O. Paper VI.)

Pepper.

During my tour I saw several cases of the wilt disease of Pepper, and indications that it is fairly general in the district. This disease has done a large amount of damage in the Wynaad, and, where the pepper is planted close, spreads rapidly. It is important in a district like Coorg, where the pepper cultivation is in the hands of small cultivators, that steps should be taken at once to check the spread of this disease. Apparently it is at present comparatively rare, but each year that no precautions are taken the fungus will spread, and when it is well established it will be a difficult and expensive matter to control it. At present it can probably be checked, and even exterminated, if a little systematic care is taken. The matter was carefully gone into in my report upon my tour in Wynaad (Sc. O. papers XII) and recommendations are there made for dealing with the disease, and I would refer all those who are interested in the pepper cultivation in Coorg to that report.

Ceará Rubber.

I saw a good deal of Ceará Rubber, and was favourably impressed with its appearance. It must be remembered that this, like other crops, will respond to good soil, and good cultivation. Preliminary experiments made in a rough way without any special apparatus are yielding samples of rubber which are valued at top prices, so that the industry seems to be a promising one. The trees grow readily, and if not so rapidly as in some other districts, still rapidly enough for practical purposes. It is possible that some trouble may be experienced with the tapping, but it should be possible to overcome this by the adoption of a system of vertical tapping, and the use of dripping tins containing Ammonia to induce a longer flow of latex. In a plantation of Ceará trees a large number of varieties will be found, and yield of rubber and latex will vary very much from tree to tree. New clearings should be planted up from cuttings taken from a tree which has been found by experiment to give a good yield, since seed will not come true. I saw no reason to suppose that this industry will prove anything but satisfactory in the district.

RUDOLPH D. ANSTEAD, *Planting Expert.*

7-1-1910.

SELECTION FOR THE IMPROVEMENT OF COFFEE.

Experiments are being undertaken by the Department of Agriculture of the Dutch East Indies, with a view to obtaining improved varieties of coffee by selection. After several years' trials, it has been found that the ordinary methods of selection which are applicable in the case of annual plants, such as that depending on the actual weight of the seed or on its specific gravity, do not give appreciable results with coffee; on the contrary, great differences were found between the descendants of different seed-trees. In the experiments, the seeds of each tree were sown and cultivated separately. The growth and production of the different lots were compared among themselves, and the tree which gave the most vigorous and productive descendants was chosen to provide seed for the future.

A report on the experiments states that the study of the variability of species is intimately connected with the methods of selection employed. The characters of the seed-trees have been studied in detail, and the average values of the variable characters have been calculated according to the methods of Galton and Quetelet. In many cases, it has been possible to separate a large number of varieties, which have been proved constant by sowing, from the typical species; thus, under *Coffea arabica*, no less than fourteen such varieties have been described.

Notes and Comments by the Scientific Officer.

1. *Fish Manure*.—A correspondent asks as to the relative value of whole and milled fish as a fertiliser.

I find from Dr. Lehmann's analyses of West Coast Fish, that the average composition of the two forms is as follows:—

		NITROGEN.			PHOSPHORIC ACID.		
		Average	Maximum	Minimum	Average	Maximum	Minimum
Milled Fish	...	5'86	8'72	3'96	4'79	7'51	1'73
Whole Fish	...	5'78	7'61	3'96	3'57	5'42	1'73

From these analyses it appears that there is little difference between them as a plant food, but the milled fish appears to always contain a very large amount of sand, and insoluble matter. The average amount of this adulterant in the samples of milled fish analysed in 1905-1906 was 34'89 %, while the whole fish contained only about 3'5%. Carefully dried fish should not contain more than 10% of insoluble residue, and the high sand content of the milled fish seriously detracts from its value as a fertiliser.

I have recently received two samples of fish manure, one whole fish and the other hand milled, from the 'Fisheries' Limited at Cannanore. It is claimed by the manufacturers that these are free from sand, and though I have been unable, as yet, to make analyses of these samples, a rough test for insoluble mineral matter gave a very favourable result.

2. *Sheep Manure*.—The same correspondent asks for an analysis of sheep manure. I have been unable to find any analysis of local sheep manure, but the following is an average analysis of sheep manure as obtained in the West Indies:—

Moisture	...	...	28 %	Nitrogen	...	...	1'5 %
Organic matter	...	...	38 %	Phosphoric Acid	...	...	0'75 %
Sand	...	...	13 %	Potash	...	...	2'5 %

A ton of such manure supplies 31 lbs. of Nitrogen, 16½ lbs. of Phosphoric Acid, and 46½ lbs. of Potash.

3. *Lecanium imbricans*.—In my report on a tour in Mysore (Sc. O. papers VIII) a scale insect was mentioned as being found on *Cedrela Toona*, and several species of *Ficus*, which caused the death of the Coffee beneath by smothering it with a thick coat of 'black blight.' This scale has since been found in several other districts.

It is a large limpet-like, grey scale, nearly half an inch in diameter, which occurs in densely crowded masses, the individuals overlapping one another, on the under sides of the branches, giving them a curious silvery appearance. The eggs, which are of a delicate pink colour, are produced during the monsoon in large numbers.

Material was sent to Mr. E. E. Green, the Government Entomologist, Ceylon, who has determined it as *Lecanium imbricans*.

Owing to its large numbers this scale causes the death, not only of the coffee beneath the shade trees attacked, but also, of the trees themselves, and wherever it is found the infested branches should be cut off and burned.

4. The Genus *Lecanium* contains many very harmful species of scale, familiar examples being *Lecanium viride*, the Green or Pulney Bug, and *Lecanium hemisphaericum*, the Brown Bug, both of which attack coffee.

In the Anamallais another species of this genus, *Lecanium marsupiale*, was found on the leaves of a Pepper vine. This is a large, thin, black scale, and leaves attacked should be picked off and burned as soon as the scale makes its appearance.

DISTRICT PLANTERS' ASSOCIATIONS.**Anamallai Planters' Association.**

Abstract of Proceedings of a Meeting of the General Committee of the Anamallai Planters' Association held at Castle-Croft Bungulow, on Wednesday, the 12th January, 1910.

Present :—G. A. MARSH, E. W. SIMCOCK, C. R. T. CONGREVE, and C. H. BROCK, (*Honorary Secretary*).

Mr. G. A. Marsh was voted to the Chair.

1. *Abkari Report*.—READ letter from Mr. Simcock, dated 10th December, 1909, correcting misstatements in the Report of the Coimbatore Abkari Inspector dated 24th November, 1909; and letter to the Assistant Commissioner, Abkari Department, Trichinopoly, dated 14th December, 1909, enclosing copy of Mr. Simcock's letter and explaining the expressed views of the Association as to the illicit selling of liquor.—*Recorded*.

2. *Accounts*.—The Accounts for the past half year were laid before the Committee for approval. These were audited by Messrs. Marsh and Congreve.

3. *Annual General Meeting*.—Wednesday, the 16th February, was fixed for the Annual General Meeting to be held at Monica Bungulow, at 9 A.M.

4. *The Planters' Benevolent Fund*.—READ Rules of the Southern Indian Planters' Benevolent Fund ("Planters' Chronicle" pp. 207—208).

The Honorary Secretary was instructed to circulate a Subscription List to all Members. Rs.850 was subscribed at the Meeting, distributed over the first five years.

5. *Branch Roads*.—READ letters from Mr. Duncan, dated 2nd January, 1910, and Mr. Simcock, dated 3rd January, 1910 asking if any correspondence had passed between the Association and the Government of Madras during the past year with reference to the construction of Branch Roads in the District, and requesting that copies of any orders that Government may have passed on this subject might be furnished. Read replies to the above letters, dated 5th January, 1910, and letter to the Secretary to Government, Public Works Department, dated 5th January, 1910, asking for information.

Recorded pending a reply from the Government of Madras.

6. *Public Bazaar and Chuttram*.—READ letter to the Collector, Coimbatore dated 12th December, 1909, regretting that no reply had been received to the former correspondence on this proposal, and his reply, dated 20th December, 1909, in acknowledgment but giving no information.—*Recorded*

The Honorary Secretary was instructed to again address the Collector, requesting an early reply to this proposal.

7. *Cinchona*.—READ extracts from letters from the Hon'ble Mr J G. Hamilton, dated 15th December, 1909, 20th December, 1909, and 6th January, 1910, with reference to Purchase of Cinchona Bark, and extract from a letter in reply dated 27th December, 1909 —*Recorded*.

8. *Hospital* —READ letters to the District Surgeon, dated 12th December, 1909, and 27th December, 1909, with reference to the proposed establishment of a Hospital in the Anamallai District, and his letter, dated 27th December, 1909, in reply; extracts from letters from the Hon'ble Mr. J. G. Hamilton, dated 9th December, 1909, 15th December, 1909, and 6th January, 1910, and replies dated 12th December, 1909, 21st December, 1909, and 27th December, 1909, especially with reference to the Association's subscription towards maintenance; letter from the President, District Board, stating that the District Board was unable to provide any funds towards the Proposed Scheme but would address Government to make the necessary provision from Provincial Funds, and acknowledgment of the same, dated 27th December, 1909;

letter from the President, Taluk Board, notifying the District Board's Resolution and complaining of the absence of the Planting Representative from the District Board Budget Meeting; and letter in reply, dated 21st December, 1909, pointing out that the Planting Representative received no notice of the District Board Meeting until twelve hours after it had been held.—*Recorded.*

The Committee noted with regret that the District Board were unable to provide any money for this scheme, but expressed their thanks to them for having asked Government to make the necessary provision out of Provincial Funds.

9. *Kardars' Hair*.—READ letters from the Tahsildar of Pollachi dated 14th December, 1909 and 29th December, 1909, requesting samples of hair from both sexes of the Karder Tribe; letter in reply, dated 27th December, 1909; letter to Mr. Congreve, dated 17th December, 1909, and his reply, dated 17th December, 1909, notifying that he had written direct to the Collector on the subject.—*Recorded.*

10. *Leases*.—READ letter to the Collector, dated 12th December, 1909, requesting a reply to this Association's former correspondence, and reiterating that, if there was anything further that the Association could do to expedite the issue of the Leases, its Members were only too ready and willing to carry it out; letter in formal acknowledgment of the same, dated 22nd December, 1909; letter from the District Forest Officer South Coimbatore, dated 6th December, 1909, stating that the question of the issue of Leases was under the consideration of the Board of Revenue, which had been reminded, and letter of acknowledgment in reply, dated 14th December, 1909; extracts from letters from the Hon'ble Mr. J. G. Hamilton, dated 15th December, 1909, 20th December, 1909 and 6th January, 1910, and reply dated 27th December, 1909, all in regard to the continued delay in issuing the Leases.

This correspondence led to considerable discussion. The Committee recorded with regret that the delay in issuing Leases still continues.

11. *Liquor Passes*.—READ letter from Mr. Congreve complaining that a pass for the transport of Arrack had been refused to Mr. A. H. Sharp by the Head Assistant Collector, on the grounds that Mr Sharp's name was not on the list of those Planters to whom the Board of Revenue had extended this concession and asking for records dealing with the same; letter in reply, dated 31st December 1909, regretting that there was no such record on the Association files; and letter to the Head Assistant Collector dated 31st December, 1909, requesting him to be so good as to forward a copy of the list referred to.—*Recorded*

12. *Membership Roll*—The Honorary Secretary was instructed to write to all gentlemen eligible for election (see Rule 2) with reference to Membership under the New Rules of the Association

13. *Police on Coffee Duty*—READ letter from the Assistant Superintendent of Police dated 17th December, 1909, complaining that the bandy-men, transporting Coffee give a lot of trouble to the Police by halting their bandies in the villages of Kotur and Maliandipatnam, each bandy-man in a different place, and leave the bandies unguarded for one or two days and nights, and consequently it is impossible for the few police on special Coffee Duty to keep guard over all the loads of Coffee. He requests that the forwarding agents be made to halt their bandies in one place. Read reply, dated 21st December, 1909, notifying that all Managers of Estates would be requested to give the necessary instructions to their various forwarding agents.—*Recorded.*

It was noted that the Castle-Croft Estate forwarding Agent, in spite of repeated warnings, had continued to disregard the wishes of the Police, and the Agent has therefore been dismissed.

14. *Re-Survey of the Anamallai Hills*.—READ letter from the District Forest Officer, South Coimbatore, dated, 14th December, 1909, notifying that the Government of India are about take up a resurvey of the District, and

requesting that the various Estates Managers will assist the Surveyors in their work as far as possible, and stating that the Maps will in no way form part of the Lease, but will show contours of hills, streams and all the various details and should therefore be of interest to the planting community. Read reply, dated 21st December 1909, in acknowledgment.—*Recorded.*

15. *Telegrams*—READ letter, dated 12th December, 1909, to the Director General of Telegraphs requesting a reply to the representations of the Association; letter from the Officiating Director General of Telegraphs, dated 8th January, 1910, forwarding the latest instructions issued for the guidance of Telegraph Offices on the subject of insufficiently addressed telegrams, and notifying that arrangements had been made with the Contractors for Government Printing to have the gumming of envelopes done by machinery as in the case of ordinary envelopes, and that the Post Office Authorities have issued instructions to the Offices concerned to see that the envelopes are cleanly and properly closed; and letter, dated 11th January, 1910, in acknowledgment.—*Recorded.*

16. *Sale of Stamps*—READ letter from the Head Assistant Collector, dated 8th December, 1909, asking if it would be advisable to arrange for sale of General and Court fee stamps at Valparai Post Office; and reply, dated 14th December, 1909, pointing out that such an arrangement would be fully appreciated by the Planters in the District.—*Recorded with satisfaction.*

17. *Warrants*—READ: letter to the District Superintendent of Police dated 14th December, 1909, in reply to former correspondence; letter from the District Superintendent of Police, dated 28th December, 1909, notifying particulars of four warrants that have been returned unexecuted on the grounds that the warrantees were in Cochin, and letter, dated 5th January, 1910, in acknowledgment.—*Recorded.*

18 U. P. A. S. I.

(a) *Coffee Curing Charges*.—READ Circular No. 97 giving the opinion of the North Mysore Planters' Association.—*Recorded.*

(b) *Coffee Cess*.—READ:—Circular No. 100, notifying the request of the Government of Madras for statistics, as approximate as possible, to show what proportion of Planters, whether represented by District Associations or not, are in support of the Proposed Coffee Cess; and Circular No. 2, giving the Planting Member's Suggestion that Honorary Secretaries might certify before a Magistrate that there is no opposition in their Districts, and ask for any other suggestions.—*Recorded.*

The Honorary Secretary was instructed to obtain and forward the Statistics asked for

(c) *Labour Problems*—READ letter to the U. P. A. S. I., dated 12th December, 1909, notifying the Association's approval of holding a Mass Meeting of Planters to discuss Labour Problems; Circular No. 1, notifying the opinions of Mr. H. P. Hodgson, Mr. Aylmer Martin, the Shevaroy Planters' Association, the Wynaad Planters' Association and the Central Travancore Planters' Association; and letter from Mr. Aylmer Martin dated 23rd December, 1909, enclosing copy of his Report to the Kanan Devan Planters' Association on the last General Meeting of the U. P. A. S. I.—*Recorded.*

(d) *Planting Member*.—READ Circulars No. 98, enclosing letter from the Planting Member giving particulars of his work on various subjects; No. 102, announcing the election of Mr. John G. Hamilton to represent the Planting Community on the Council of Fort St. George, and No. 103, conveying the Hon'ble Mr. J. G. Hamilton's thanks and great appreciation for having been elected.—*Recorded.*

(e) *Renard Road Train*.—READ letter to the U. P. A. S. I., dated 14th December, 1909, pointing out the very large amount of grain traffic that exists between Coimbatore and Pollachi.—*Recorded.*

- (f) *Roads and Communications*.—READ Circular No. 108 with reference to the proposed repairs to roads in the Madura District.—*Recorded*.
- (g) *Scientific Officer*—READ Circular No. 101, notifying the orders of the Government of Madras on the subject of the relationship of the Scientific Officer appointed to assist the Planting industries, to the U. P. A. S. I.—*Recorded*.

A vote of thanks to the Chair terminated the Proceedings.

(Sd.) G. A. MARSH, *Chairman*.

(Sd.) C. H. BROCK, *Ho. y. Secretary*.

PAPERS ON THE TABLE.

1. The "Planters' Chronicle" for December 1909.
2. The "Planters' Chronicle" for January 1910
3. Abstracts from the Proceedings of the General Committee of the Indian Tea Association at Meetings held on 30th November, 1909, 14th December 1909 and 28th December 1909.
4. Proceedings of the Agricultural Society of Trinidad and Tobago for October 1909.
5. Proceedings of a Meeting of the Planters' Association of Malaya held on 5th December 1909
6. Tea Statistics for November 1909 issued by the Indian Tea Association.

The new regulation to prevent the introduction of Blister Blight into Ceylon by the importation of Tea Seed will come into force from 1st February 1910, not 1st January 1910 as was originally proposed.

At a meeting of the Ceylon "Thirty Committee" at Kandy on the 15th January consideration was given to a letter from a large importer of Green teas in the United States stating that he found it almost impossible to purchase uncoloured Green teas. "Not only are prices extraordinarily high, but the teas are difficult to get. They are either not being made or the demand had increased out of all proportion to the supply. Prices asked 9½d. f.o.b. here for teas bought last year at 9½d. and 8½d. for low grown Hysons. The trade is simply going to be killed by inability to get the goods, i.e., pale liquoring, uncoloured green tea. The green tea business is one worthy the Planters' attention."

The *Times of Ceylon* observes that within the last few months green tea has advanced 3 to 5 cents. When the price goes beyond a certain figure American buyers keep off the market, refusing to give the price asked for and preferring to buy the cheaper tea of other countries. At least one local buyer for the American market has stopped because of the enhanced prices, but he says there is a good business waiting green tea at fair prices.

The Committee of the Planters' Association of Ceylon has declined, on the plea of insufficient available funds, to entertain a proposal from the British Chamber of Commerce, Paris, to represent Ceylon and assist in furthering the Island's interests throughout France.

Mr. David Wilson, of Dundee, has written to the Planters' Association of Ceylon, calling the attention of Rubber planters to the very valuable asset they have in the seeds of the rubber trees for the production of oil and cake, and urging the Association to "press on" with the development of a trade in these products.

INDIAN TEA ASSOCIATION, CALCUTTA.

Extract from Abstract of the Proceedings of a Meeting of the General Committee held on December 1909.

Correspondence with the Indian Tea Association (London).—Letters of 3rd and 10th December from the Secretary, Indian Tea Association (London), were ordered to be recorded. The principal subject dealt with in them was as follows:—

The Rejection of the Budget.—Sir James Buckingham sent a report of meetings of Tea Importers and Brokers held to discuss the position in view of the rejection of the Budget by the House of Lords. A deputation from the Ceylon and Indian Associations in London had had an interview with the Chairman of the Customs and they presented the report of their meeting. A considerable discussion had then ensued, and two resolutions were carried, the first relating to sales of tea which had actually taken place, the second to future sales. The resolutions (which were carried unanimously) were in the following terms:—

“ That whereas to-morrow Government will cease to collect duty
“ on tea and that whereas a proclamation about to be issued
“ under the authority of His Majesty's Customs holds the importer
“ of tea liable for any duty that may be re-imposed and made
“ retrospective with regard to teas that may be delivered after
“ to-day and before the duty is re-imposed, this meeting of
“ importers emphatically protests against being held responsible
“ for the payment to the Treasury of any duty that may be
“ hereafter levied more especially with regard to teas which
“ have been sold and over which importers have consequently
“ no control.”

(1) That on and after this date, and until further notice, all teas sold in public auction shall be sold subject to the following condition of sale, which shall be numbered 7a, and which shall be in addition to the now existing conditions of public sales:—

“ Buyers shall deposit with His Majesty's Customs, before
“ taking delivery, a sum equal to the amount of duty
“ imposed under the resolution of the House of
“ Commons passed since the 1st April 1909, and to be
“ retained against any re-imposition of such duty, but
“ no such deposit shall be required if the teas be
“ removed only for export or ships' stores, or to other
“ bonded warehouses under hitherto existing bonding
“ arrangements of His Majesty's Customs.”

(2) That warrants issued and representing tea sold in public auction on and after this date and until further notice shall contain the following addition to the clause commencing “ The Possessor of the Weight Note ” and ending “ on or before the expiration of the prompt ” *viz* :—

“ And upon deposit with His Majesty's Customs of the
“ amount that would have been payable for duty had
“ the Budget Resolution passed since the first of April,
“ 1909 remained in force, but no such deposit shall be
“ required if the tea be removed only for export or
“ ships' stores or to other bonded warehouses under
“ hitherto existing bonding arrangements of His Ma-
“ jesty's Customs.”

The Planters' Chronicle.

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(INCORPORATED.)

Pepper-Vine Disease in the Wynaad.

The Imperial Mycologist has kindly forwarded the following copy of a letter, dated 25th December, 1909 from Mr. T. McRae, Offg. Imperial Mycologist, to the Director of Agriculture, Madras :—

I have the honour to report my observations on the pepper vine disease made during my tour in Wynaad in November. The badly diseased area, I visited, lies in a valley from Vayitri on the west to beyond Meppadi on the east. The various stages of the *Nectria* fungus presumed by Dr. Butler, [See Agricultural Journal of India, Vol. 1, Pt. 1, p. 25, 1906] to be the cause of the disease were found and also the eelworms whose tubercular swellings are commonly found on the roots of the vines. The latter are probably not necessary forerunners of the disease though it is possible they sometimes wound and weaken the roots so much that the fungus has a more favourable field for its operations.

Much work will have to be done in investigating the conditions of the growth of the fungus in the soil, its methods of getting into the roots of the vines, and its means of spreading from vine to vine. At present these are not definitely known. Till the life history of the fungus is worked out it is difficult to see one's way through the apparently contradictory experiences of planters. The same treatment seems to have acted differently in different cases. Cultivation and application of cattle manure are condemned on the one hand and praised on the other as the only means of saving the vines. I have been assured that after a diseased stem and the upper parts of the roots to the depth of about a foot have been removed, new cuttings may be planted immediately and that the percentage of these cuttings that strike is not less than that in places which had not previously supported diseased vines. I was shown such that were five years old and still look healthy. But the reverse is the case in some other instances. No way has as yet been found of lessening the attack of the disease. Direct treatment of diseased vines with a view to kill the parasite is of no use. Once it gets inside the tissues of the vine, it cannot be got at by fungicides.

Seed treatment of undiseased vines to prevent their becoming diseased is more promising. Liming the soil in the few cases where it has been tried seems to have kept the vines in a healthy condition. Accordingly Mr. Austead and I drew up a scheme of experiments to be conducted in South Wynaad and to be supervised by him. A copy is enclosed. I believe much could be done by cultivation to improve the general health of the

vines and this aspect of the question the Planting Expert is taking up. The real way, however, to combat a root disease of this kind is to cultivate varieties of pepper vine that are resistant to the disease. As the vines grow very slowly this kind of work will be very tedious and definite results may not be expected for a long time.

There are two possible lines of action—

- (1) Selecting from resistant individuals:—Certain individual vines nearly always survive the attack of the disease in a place where many die. Seed or cuttings from the plants that withstand the fungus attack are used as the starting point for a disease-resistant variety. Selection is repeated time after time, seed or cuttings from the most resistant plants being taken.
- (2) Crossing;—The other line of action is to cross a plant that has been found to be resistant to the disease with a susceptible plant that is a good yielder. In this way there might be combined in the hybrid the disease-resistant character of the one parent and the productiveness of the other. As pepper vines take from 5 to 7 years to come into bearing both these methods will be very tedious and take a good many years to produce satisfactory results.

I hope you will be able to give me a part of the Taliparamba farm for experimental work with the disease. When I was there on the 29th November I found no vines suffering from the disease except one doubtful case near the office.

I have a pure culture of the *Nectria* in the laboratory but want more cultures for the further study of the fungus.

SCHEME OF EXPERIMENTS TO BE CONDUCTED IN S. WYNAAD IN CONNECTION WITH THE PEPPER WILT DISEASE.

When a suitable experimental area of Pepper cultivation has been chosen, all dead and diseased vines should be removed and burned.

The healthy vines should then be counted into plots, each containing 200.

These plots are to be treated as follows:—

Plot A.—200 vines. Handled in the usual way, no special cultivation or treatment given. The plot will act as a control.

Plot B.—To be divided into two:—B1 containing 100 vines, and B2 containing 100 vines.

Plot B1.—Slaked lime is to be broadcasted over the ground covering the area of the root system, 2 lbs. being given to each vine. After application it is to be lightly covered over with either soil, or mulch. The application is to be given 3 times; 1st application in June, 2nd in July, and 3rd in August.

Plot B2.—To receive exactly the same treatment as plot B1, but, in addition, each vine is to have a trench cut round it outside the root system, 2 feet deep, the soil taken from the trench being mounted up round the base of the vine.

Plot C.—Bordeaux mixture is to be applied at the rate of $\frac{1}{2}$ -gallon to each vine. It is best applied from a sprayer, but a watering can may be used. The bottom 3 or 4 feet of the vine are to be thoroughly drenched and also the soil near the collar.

Four applications are to be made; the first just before the monsoon, and the others at regular intervals of six weeks.

A record will be kept on each plot of the numbers of vines which develope the disease during the year, and each vine, as it dies, is to be removed and burned.

"Smother" Plants.

Mucuna Lyonii.

Mr. C. Driberg, Secretary to the Ceylon Agricultural Society, kindly forwarded to the Scientific Officer a small supply of a seed which, as far as the former gentleman can make out, is *Mucuna Lyonii*; and he suggested that it might be useful as a smother plant for scale insects on Coffee. The seed has been distributed among several planters on the Nilgiris and Shevaroy's, who have kindly undertaken to make a trial of it. Unfortunately, this is not a good time of the year for planting it out.

Bengal Bean.

A small supply of the seed of the Bengal Bean (*Mucuna pruriens*, var.) has been received from the West Indies, and distributed in a similar way. The announcement recently made that this seed was expected brought in requests for a much larger quantity than was received, and one or two planters had to be informed that their inquiry was too late.

Mr. Anstead has prepared brief

SUGGESTIONS AS TO THE PLANTING OF SEED,

applicable to both the above varieties of *Mucuna*. He suggests in regard to experiments such as those contemplated that a definite area badly attacked by scale be chosen and that the seeds should be sown two at a time at distances of four feet apart down each row of Coffee and the resulting vines made to grow over the top of bushes so as to completely smother them up. When this stage has been reached a constant inspection should be made to note the effect upon the Coffee on the one hand and the scale on the other. The exact stage at which the vine should be cut and killed can only be determined by actual experiment.

Mr. Anstead hopes to be able to visit the Nilgiris, at least, in time to see the experiment before it reaches its final stages and to discuss it in the field with the planters who are conducting it.

Leguminous Crops.

Arrangements have also been made for the experimental planting of seeds of several leguminous plants for use as cover plants and green dressings solely with a view to getting a supply of seed. Mr. G. H. Krumbiegel, Economic Botanist and Superintendent of Government Gardens, Mysore, is kindly undertaking part of this work, and the Secretary to the U. P. A. S. I. has also had various seeds planted out in his garden.

The Madras Agricultural Calendar.

An intimation from the Director of Agriculture, Madras, states that the price of the Agricultural Calendar for the current year has been reduced to one anna per copy.

These Calendars can be obtained from the Superintendent, Government Press, Madras.

Mr. W. E. Glenic, of Poona Poya Estate, Vellaramala, and Mr. K. Krishna Gowndan, landlord and owner of estates in the Wynaad Taluk, have been authorized by the Government of Madras to attest Labour contracts.

Scientific Officer's Papers.**XIV—BLACK ROT LEAF DISEASE OF COFFEE.**

I propose, provided that the Council of the U. P. A. S. I. consent to my doing so, to begin a thorough investigation of the Black Rot disease which does so much damage to Coffee in various districts, during the 1910 monsoon period.

Very little is at present known about the life history of the fungus, (*Pellicularia Koleroga*), which produces this disease—and it will greatly aid my investigations if as many planters as possible in the infected districts will conduct a series of experiments on the following lines, and I hope that planters concerned in each district will afford me assistance by taking the matter up. It is only by our mutual co-operation that anything can be done, and I feel assured that planters will be willing to meet me in the matter.

An experimental area should be chosen in a spot which is known to be annually attacked by Black Rot, otherwise no conclusive evidence can be obtained as to the possible remedial effects of the methods adopted. There must be some untreated bushes, under ordinary conditions, to serve as a standard of comparison.

The selected area should be divided into plots of 25, 50, or 100 trees, as may be convenient (the larger the number the better), and I would suggest that these plots be treated in the following different ways:—

- (1) The soil heavily limed during the dry weather; the lime being mixed with the mulch, and both lightly forked in.
- (2) The trees centred just before the monsoon begins.
- (3) The trees centred, and pruned, just before the monsoon begins.
- (4) The stems and primaries scraped just before the monsoon begins.
- (5) The stems and primaries white-washed just before the monsoon begins.
- (6) The stems and primaries white-washed, and the trees centred and pruned just before the monsoon begins.
- (7) The stems and primaries white-washed, and the trees centred and pruned at the usual pruning time.

The cost of each method should be recorded, and also the possibility of the adoption of each method over a large area, taking the labour supply at the time of year into consideration.

None of the plots experimented with should be manured, or if they are, all should receive exactly the same manurial treatment.

A good white-wash which will not wash off readily during the rains can be made according to the following formula:—

To half a bucketful of unslaked lime add two handfuls of common salt, and then soft soap at the rate one pound to 15 gallons of wash. Slake slowly, stirring all the time.

The wash should be made of a fairly thick consistency so that it can be applied like paint, and a note should be made of the quantity required to treat each plot.

RUDOLPH D. ANSTEAD, *Planting Expert.*

Notes and Comments by the Scientific Officer.

5. *Large shell Seeds*.—It is often difficult to get seeds with large shells to germinate, as witness the trouble experienced with seeds of Ceará and Manihot Rubber. In Vol. XXII No. 155 of *Le Jardin* the following method is recommended to hasten the germination of such seeds;—

"The seeds are placed in a small sieve, or pocket, of wire gauze, a few at a time, which is plunged into boiling water for a period of 10 to 20 seconds, depending on the hardness of the seed. In the case of small seeds, the sieve is plunged into cold water immediately after being taken out of the boiling water. The object of dealing with a few seeds only at a time, is to ensure that the boiling water shall have the full effect. By this means hard seeds were made to sprout in 10 days".

This neat application by our French friends, of a method we have tried with our rubber seeds is worthy of adoption.

6. *Mistletoes*.—To a stranger visiting a tropical country for the first time one of the most striking features of plant life is the occurrence of dense masses of "mistletoe" on the jungle trees. These are semi-parasites, and when they grow in quantity on cultivated trees may become a serious pest. In Coorg and Wynaad one of these mistletoes, a species of *Loranthus* known locally as "Bandalike," does considerable damage to Citrus trees, and another species with smaller leaves damages the shade trees. The following is extracted from the *Agricultural News*, VIII. 196:—

"Mistletoes" supplement the food produced in the leaves by a certain amount which is obtained by them, with the aid of special organs for the purpose, from the plants to which they are attached. These organs are called haustoria; they are not true roots, for they do not possess root hairs, and they have the power of secreting a ferment which dissolves a path for the haustorium which produces it through the tissues of the host plant. They have another function also; it is by them that the plant food which is destined for use in the Cambium layer is transferred to the parasite, an action that may take place to such an extent as to weaken or destroy the host plant."

"The only remedy is removal by cutting the mistletoe out of the affected branch, or branches. It must be clearly understood, however, that the mere removal of the parasitic plant alone is useless, as the haustoria left in the branch will most probably produce new shoots of it. In cutting it out, therefore, a fairly large portion of the branch should be removed as well; in the case of badly affected plants, whole branches, or even the whole plant, may have to be removed."

To this may be added that it is advisable to perform this operation of cutting out before the mistletoe flowers and produces seed, as it is spread from tree to tree by the agency of birds to some extent.

It is very gratifying to know, with regard to the statement that plantation rubber is inferior in strength and resiliency to Fine Hard Pará, that Mr. Kelway Bamber, the Ceylon Government analytical chemist, is firmly of opinion that this is purely a matter of treatment, and that, if they take the necessary pains, Ceylon planters can turn out rubber equal in strength to the Amazon rubber.

DISTRICT PLANTERS' ASSOCIATIONS.

Wynaad Planters' Association.

*Proceedings of Annual General Meeting, held at Meppadi Club,
January 12th, 1910.*

PRESENT:—Messrs. Abbott, Atzenwiller, Behr, Bissett, Ewart, Elphinston, Fleury, Halleley, Mallerby, Parry, Powell, Trollope.

By Proxy: Brown, Carslake, Glenie, Macleod, Walker, Waddington, Mead, and *Hony. Secy.* B. Malcolm.

Mr. ABBOTT in the Chair.

1540. *Election of New Members.*—The following gentlemen were elected:—Messrs. A. Brown, J. Hudson, E. H. Halleley, A. C. Fleury, W. E. Glenie, W. Morris, C. Howland, A. C. Mallerby.

1541. The Honorary Secretary read the *Annual Report*, which was ordered to be printed.

ANNUAL REPORT.

January 1910.

In accordance with our usual procedure I have to make the following report on the year's work of the Association.

The year closed with 41 members on the roll, of whom 2 go off as from January 1st, having left the district.

2 new members joined during the year, and there are 7 Honorary Members.

The accounts for the year are on the table for your inspection.

The new rate of subscription has been in force for the year and affords sufficient income to meet our ordinary expenditure and leave a small margin: but allows for no heavy item which if needed at any time must be met by special subscriptions if the present rate of subscription is maintained.

One of the most important events of the year has been the appointment of the

Scientific Officer.—Mr. Anstead who is now our scientific adviser, was appointed as from April 16th, 1909. His head quarters are in Bangalore and his office one with that of the U. P. A. S. I., which corporation he is to be entirely at the service of.

The material support of the Governments concerned, and the active support of the Madras Government in obtaining the services of Mr. Anstead have enabled planters in S. India to secure this much needed aid; and it now rests with ourselves to afford Mr. Anstead such help in carrying out the practical part of his work as will ensure useful information being obtained.

Mr. Anstead joined Mr. McRae in his recent tour in Wynaad and visited a number of estates: and the report made by him has been duly circulated among members.

Pepper-vine disease.—This seems to have been fairly general over the district; in parts bad but on the whole perhaps not worse than in previous years. We have to thank Government for sending us the Imperial Mycologist, who made a very careful examination of the disease, and in conjunction with Mr. Anstead, the Scientific Officer, has proposed a scheme of Experiments for its control. It rests with those interested in this cultivation to carry out these experiments as carefully as possible with the readily available advice of the Scientific Officer; and with the prospect of Mr. McRae coming to Coimbatore and the consequent chance of his being able

to carry his investigations to a conclusion, there seems a more hopeful prospect of the study of the disease resulting in its control. A hopeful feature is that though a careful search was made for the fungus spores on the surrounding vegetation, they were only found on diseased and dead vines, and there should consequently be less difficulty in destroying them.

All the information given to the Association by Mr. McRae has been printed and circulated among members.

Rail freights on Tea.—Our action in this matter has resulted in the previous concession of the special rate of 6 annas per maund on quantities of 12 tons of tea railed from Calicut to Madras being now applied to any quantity. The Traffic Manager of the S. I. R. has also assisted us by reducing the freight on tea from Calicut to Cochin (Ernakalum) from 4 annas 8 pies to 3 annas 1 pie per maund for any quantity.

Liquor Shops.—Our prolonged agitation has finally resulted in the Schedule of arrack shops for the next official year having been submitted to the Association for approval. This procedure if maintained will be of considerable assistance to us, and it is to be hoped this admirable arrangement will be continued.

Labour Matters.—All planting districts with one or two fortunate exceptions seem agreed that the position as regards labour generally is unsatisfactory, and it remains to be seen whether there will be sufficiently concerted action in the near future to remedy the difficulties that exist.

With the large and steadily increasing oversea demand for labour, the question arises whether we should not set on foot enquiries to try and discover whether the emigrant cooly really benefits by emigration to the extent he is led to expect. The steadily increasing demand in S. India should remove reasons there may hitherto have been for affording any special facilities to assist emigration.

The consideration of the question of the general adoption of Act I of 1903 by all planting districts has raised, as usual, a great deal of controversy. In their reports on the working of the Act in the Nilgiris and Wynaad for the year 1908 the respective Collectors of those districts have recorded that the Act has worked satisfactorily. No case of hardship under the Act has been brought to the notice of the Association during the year.

We applied early in the year that powers might be granted, to persons to be appointed by the Association, for the attesting of labour contracts in Coimbatore. Government were, however, unable to grant our request for reasons we have been told of and which seem reasonable.

Three cases have been brought up by members in which the local Sub-Magistrate refused to grant warrants against defaulting maistries on the plea the cases were time-barred. Two of these cases have been satisfactorily disposed of by the District Magistrate, and the third is having his consideration.

Roads.—Our representations have met with attention; and though parts of some of the roads are not all we should like them to be, the roads in the district are on the whole improving in condition. An exception is the Vellera Mulla road, for which funds seem quite inadequate.

A point we need to draw the attention of the authorities to is, that owing to the rapid spread of Lantana in the district, and its quick growth, the rates for cutting back the road edges need increasing on parts of some roads. Owing to its quick growth this pest needs to be cut back further than ordinary jungle, or if not to be cut twice a year.

Special Crops Police.—The force that had for a great many years past been specially deputed to protect coffee crops has been discontinued on the

old lines with the concurrence of the Association, the reason being that the cost incurred was not justified by the small crops now picked.

The new arrangement proposed was that 1 Head Constable and 1 Constable should be posted at Lakadi Toll Gate and the Vayitri division strengthened by 7 men to be employed at stations where most needed. This arrangement should supply the protection required at present.

Tea Thefts.—We are still in the position of having to try and discover some means of putting a check on the illicit outgoings of tea that are known to exist. The resolution passed at the Bangalore conference asking Government "whether they could not legislate on the lines of section 4 of the Coffee Stealing Act to prevent the sale of tea by employees of estates other than those authorised to sell the same," has brought the reply "that Government are not at present prepared to undertake legislation in the direction proposed." We must hope that the future may have in store a change of attitude, for it does not seem unreasonable to ask that it be made illegal for the employees on all estates to sell tea, if they be unauthorised, when there is no possible reason for their being in a position to do so.

Rinderpest.—This scourge has caused great loss to cattle owners, chiefly among natives. Our representation resulted in a veterinary assistant being sent up to inoculate cattle; and I understand he has been wherever wanted. With the exception of one temporary stoppage in the supply of serum, which was promptly remedied, there have been no complaints to the Association.

Pepper Stealing.—The S. Malabar Police were successful in detecting one case of exchange of rubbish for good pepper, and in bringing the charge home to the culprits who were sentenced to various terms of imprisonment. Our thanks are due to Mr. Travers Phillips for his prompt action, which we must hope may put a severe check on the exchange of pepper *en route* to the coast. That such cases of robbery will recur is certain, and our only protection depends on the activity of the Police.

Generally.—Coffee and pepper crops seem somewhat irregular, being good in parts of the district and less so in other parts. The tea crop has, I think, very generally exceeded estimates. New extensions of tea continue all over the district. Prices of tea are very satisfactory, and with the improvement in the prices of pepper we may hope for good results from this product.

In conclusion, gentlemen, I thank you for your assistance in the performance of my duties, and tender my resignation.

January 12th, 1910.

(Signed) B. MALCOLM.

The Accounts were presented for 1909 and passed.

1542. *Association Subscription.*—Read following letter from Mr. Mead :—

To The Honorary Secretary,
Dear Sir,
Wynaad Planters' Association.
East India Tea and Produce Co., Ltd.

I beg to give notice that I cannot promise to pay any acreage subscription towards the Wynaad Association funds on any of the estates owned by the above company for 1910.

Jan. 7th, 1910.

I am, dear sir,

Yours faithfully,

(Signed) A. H. MEAD.

—Recorded.

1543. A vote of thanks to Mr. Malcolm for his services during the year was passed unanimously.

1544. Mr. Abbott was elected Honorary Secretary for 1901.

(Signed) C. E. ABBOTT, *Chairman*.

(Signed) B. MALCOLM, *Honorary Secretary*.

ORDINARY GENERAL MEETING

held on same date; the same Members being present.

Mr. Malcolm in the chair.

1545. The proceedings of last meeting were confirmed.

1546. *Labour Law*.—The Honorary Secretary stated that no reply had been received to his letter to the District Magistrate of Malabar about Mr. Bisset's case.

Read letter dated December 13th from District Magistrate in reply to Honorary Secretary's letter of November 28th. This concludes the correspondence on the points raised by Messrs. West and Behr; a summary is being prepared which the Editor of "The Planters' Chronicle" will be asked to print for the information of those who are working under the Act.

1547. *Election of Taluq Board Members*.—The President writes that under the new Taluq Board election rules the membership of the Association's representative is not affected.

Motor Transport.—Read letter from Mr. Mead and Honorary Secretary's reply.

A circular was sent to Messrs. Parry & Co., Peirce, Leslie & Co., Ferguson & Co., The Manager, Mamaly Works, Feroke, and Messrs. Volkarts, asking for statistics of up and down traffic. The replies that have been received will be sent to Mr. Mead to enable him to tabulate the figures. Circulars were also sent to Members W. P. A. asking for information as regards future openings and tonnage of transport. Replies—are not complete.

Read letter from Ceylon Planters Motor Syndicate giving details of cost of motor transport to and from Banderawella terminus.

Pepper Disease.—Members willing to undertake the experiments recommended by Messrs. McRae and Anstead are requested to communicate as soon as possible with the Honorary Secretary.

Postal.—Read letter from Honorary Secretary to Postmaster-General protesting against the constant delay in delivery of mails. Postmaster-General replied that he is considering the matter.

Association Rules.—Proof of draft rules was laid on table. Read letter from Mr. Mead, giving notice that he intends to propose the following alteration in the rules: "that in future subscriptions to the Wynaad Planters' Association should be levied on an acreage basis, and that each Estate be entitled to 1 Vote for every 50 acres of cultivation on which subscription "has been paid."

This resolution will be brought up at a Meeting to be held in February, of which a month's notice will be given to all Members.

Roads 39 and 35 B.—Read correspondence; President Taluq Board, writes that the allotment on the 7 miles of Road 39 Sultan's Battery to Talloor Bridge (Nilgiri) is only Rs.350.

The allotment on 35 B from Sultan's Battery to Noolpoya is maintained at same figure as last year plus an allowance of Rs.1,350 for repairs of bridges. This latter amount the Association consider quite satisfactory if

the money is spent at the right time. Read letter from Assistant Engineer, dated 17th December 1909 regarding insufficient culverts on Estate Roads which join Road 38 and Honorary Secretary's reply. Also letter from Assistant Engineer, January 9th, making suggestions as to how this difficulty can be overcome.

Suggested that a conference be held between Members concerned and the Assistant Engineer.

Labour Matters.—Messrs. Glenie and Raitt are appointed to attest contracts.

U. P. A. S. I. Circulars.—97 to 103 of 1909 and 1 and 2 (1910) Read.

Mr. West.—Read letter from Mr. A. West, with reference to the Meeting of November 10th, 1909 at which his proxy was used, stating that while he is a supporter of the Act he did not intend to vote in favour of forcing it on other districts. Mr. Malcolm said that the notice of the purpose for which the meeting was called was sent to Mr. West.

Vote of thanks to chair.

(Signed) B. MALCOLM, *Chairman.*

(Signed) C. E. ABBOTT, *Honorary Secretary.*

Mr. H. Emerson will be put up for election at next meeting at Meppadi Club, February 16th.

South Mysore Planters' Association.

A Special General Meeting of the South Mysore Planters' Association was held at Saklasapur, on December 16th, 1909,

Mr. W. L. CRAWFORD presiding, to ballot for the election of an Additional Member of Council, and transact any business coming before the Meeting.

A ballot for the Additional Member of Council was taken and in the evening when the ballot was closed and votes counted it was found that Mr. John G. Hamilton had been unanimously elected by the members of the Association, and the result of the voting was at once intimated to the Secretary of the United Planters' Association, Bangalore, for transmission to the Government of Madras.

Act I of 1903.—After considerable discussion it was resolved that Messrs. E. M. Playfair, A. L. Park and J. Aird be appointed to meet the Representatives of the North Mysore Planters' Association at Mudigiri some time in January to discuss the measure and see if agreement can be arrived at.

The following amendment was proposed by Mr. C. K. Pittock and seconded by Mr. G. W. Gowans and lost;—"That this Association is of opinion that until the attitude of the North Mysore Planters' Association is more in sympathy with that of this Association on the subject of the Labour Question a Meeting of delegates from the two Associations should be definitely deferred."

Hospital Accommodation in Saklasapur.—Mr. S. Sladden drew the attention of the Association once more to the continued unsatisfactory condition of the existing Dispensary and in-patient wards and pointed out how exceedingly difficult it was for the Resident Medical Officer to do his ever-increasing work with the miserably inadequate accommodation and appliances at his disposal. The Association was informed that some building operations were started at the Dispensary about four years ago and are still in an incomplete condition even now. It was pointed out that the Dispensary had not been whitewashed for a long time and that there is no proper Consulting-

room or Out-patients' ward, the Resident Medical Officer having to attend to patients in a small verandah, for want of something better, which may have its advantages to those in search of open-air treatment, but not the place one would think would be selected as suitable for examining patients and performing operations.

The following Resolution was proposed by Mr. S. Sladden and seconded by Mr. C. Lake and carried:—"That the President be requested to write to the Senior Surgeon with the Government of Mysore again, inviting his attention to the very unsatisfactory accommodation at, and equipment in, the Saklaspur Local Fund Dispensary, and to request that Government take steps to improve the same."

Address to H. E. the Viceroy.—Mr. W. L. Crawford, the delegate of the South Mysore Planters' Association, who, in conjunction with the North Mysore Planters' Association delegate, was elected to present an Address of welcome to H. E. the Viceroy on his recent visit to Mysore, said:—"You will have all read with deep interest the very gracious and sympathetic reply of H. E. the Viceroy to the Address presented to him by the two Planters' Associations of Mysore. That there was nothing definitely conceded on the points raised, is very much to be regretted, and to those of us who have for years studied the matter and are interested in, and in close touch with, the industrial development of Mysore, the reply was disappointing. We can only hope when next the two Associations jointly bring forward subjects vitally affecting not only their own industry, but the interests of all those who are engaged in industrial pursuits in Mysore that the same will be received with sympathy and consideration from the local representatives of the Government of India."

The Meeting terminated with a vote of thanks to the Chairman.

(Sd.) W. L. CRAWFORD, *President.*

Central Travancore Planters' Association.

Proceedings of the Twentieth Annual General Meeting of this Association, held at Twyford at 10 a.m. on the 15th January 1910.

PRESENT:—Messrs. J. A. Richardson (Chairman), E. S. Stephens, J. F. Fraser, H. C. Westaway, C. G. Gordon, T. A. Vernon, F. Bissett, D. McArthur by his proxy J. F. Fraser, W. H. G. Leahy by his proxy F. Bissett, R. P. Roissier and Hon. V. B. Wilbraham by their proxy J. A. Richardson, and T. C. Forbes, (Hon. Secy.)

The notice calling the meeting was read and the minutes of the last meeting were confirmed.

THE CHAIRMAN'S ADDRESS.

GENTLEMEN,

I do not intend to take up your time with a long address as our Honorary Secretary's report will deal fully with the past years work. I would only say that the Tea Industry has had a fairly successful year and Peermade, I think, has had its share. Prices have been steady and crops all over the district have been good, and our position at the present moment is a very sound one.

The election of our Planting Member lately held resulted in the unanimous return of Mr. J. G. Hamilton who I am sure will do his best for us, and I trust his efforts in several matters he has already taken up will be met with success.

The Theni Bridge is still one of our pressing needs, but I trust we will soon hear definite news regarding its construction.

Coming nearer home we have had before us two most important Schemes, *viz.*, "the Motor transport to Mundakayam and the European Doctor scheme, both of which seem to be hanging fire."

That something must be done about the transport of our produce, I think is patent to every one, but there is a serious difficulty as regards the ghaut portion of it and the matter requires very serious consideration and it seems to me we must decide whether it would not pay us to increase the cart hire on the ghaut portion to enable us to get our produce away quickly, and it must also be remembered we would have a considerable saving in interest on money outstanding on heavy stocks of packing materials which we have to lay in at present owing to the uncertain state of our transport arrangements. A great deal of time has been wasted already and there is little chance of getting anything done this year before the monsoon, and should we have another outbreak of cattle disease it will be a very serious matter for the district.

The European Doctor Scheme.—I had hoped to see put through ere this as I think it is one of great importance to us all as well as to the health of our ever increasing labour force. I trust those who have not already done so will give this scheme their support and any who are not in a position to do so will again approach their principals and urge on them the necessity of the scheme.

I cannot imagine that any Company or Proprietor would grudge the subscription to a scheme which so vitally affects the health of their employers both European and native, and feel sure it only requires to be put clearly before them.

I trust, gentlemen, this matter will be taken up and pushed through with as little delay as possible.

I will not take up your time any further and must thank you for the support you have given me during the past year as your Chairman and now beg to place my resignation on the table.

THE HONORARY SECRETARY'S REPORT.

Mr. Chairman and Gentlemen,

I need not detain you long, especially as in his address our chairman has touched on most of the subjects which have come before the Association during the past season 1909.

Arrack Taverns.

Our thanks are due to Government for meeting us in the matter of the closing of the Maimalai and Kuttikonam Shops, and I am glad to say there are two arrack shops fewer in the district than there were at same date last year.

Cardamom Hill and Glenmary Roads.

As per accounts Rs.4,212-4-8 have been expended on these two roads. I think the Association's appreciation of the work done by the managers in charge of the sections should be recorded. So far only one estate (Pambanar) has intimated that it does not intend to join in any upkeep of the District roads. It is a matter for consideration if it would not be better to carry on the cess for at least one year more rather than let the roads revert to their former bad state with a probable enhanced cart hire.

Power Transport and European Medical Officer Scheme.

In these I regret not very much progress has been made and we are in much the same position as we were a year ago. Still, they have been thoroughly discussed and I think both have been proved feasible provided the necessary guarantees were forthcoming. As regards the power transport scheme our thanks are due to the Cochin firms, as their propositions must have entailed a lot of work and correspondence.

Proposed by Mr. Vernon, Seconded by Mr. Stephens.

"That the Report be adopted and accounts passed—*Carried*."

DISTRICT LABOUR RULES.

Proposed by Mr. Westaway and Seconded by Mr. T. A. Vernon.

"That the Labour Rules be put in force for another year with the addition of the following clause :—That no tundu be given to a kangany or cooly during the period of their contract time."—*Carried*.

MEMBERSHIP.

The number of members of this Association during the past year was 16, representing a declared acreage of 8,483 of acres.

CROP FOR 1909.

I am unable to give you the crop for the district, as the returns from Bonami, Ashley, and Munjamalai have not been received.

ACCOUNTS.

	Rs.	a.	p.
Subscriptions for 1909 amounted to	... 1,590	9	2
Balance from 1908 was	... 674	4	5
Bank interest for 12 months	... 36	11	0
	<hr/>		
Total Rs...	2,301	8	7
Expenditure for 1909 has been	... 1,773	9	8
	<hr/>		
Leaving a balance to be carried forward	... 527	14	11

In conclusion I have to thank you, gentlemen, for the honor you have done me in electing me as your Honorary Secretary, and I now beg to tender my resignation.

AGREEMENT FORMS.

Resolved that the Honorary Secretary send to the Magistrate a copy of the agreement form in common use in the district and ascertain if it holds good in the local district court.

FITTER FUND.

Resolved as there is a balance in hand it be carried on for the current year with no assessment till 1911.

CORRESPONDENCE.

Read letter from Messrs. Peirce, Leslie and Co., of date 22nd December 1909.

Resolved that copies be circulated to all members of the Association.

SUBSCRIPTION FOR 1910.

Proposed from the chair that the subscription should be the same as 1909, i.e., 3s per acre.

The following papers were laid on the table :—

Balance Sheet to end of December 1909 of Fitter and Forge Accounts
Dispensary Accounts, Grant-in-aid Road Account, Sircar Road Accounts, &c., &c.

ELECTION OF OFFICERS FOR 1910.

Mr. W. H. G. Leahy—*Chairman*.

" F. Bissett—*Vice-Chairman*.

" J. F. Fraser—*Honorary Secretary*.

" D. McArthur

" J. A. Richardson

" T. C. Forbes

} *Committee*.

With a vote of thanks to the Chairman, the meeting closed.

(Signed) T. C. FORBES, *Hon. Secy.*

INDIAN TEA ASSOCIATION, CALCUTTA.

Extract from Abstract of the Proceedings of a Meeting of the General Committee held on December 28th, 1909.

Scientific Department: (a) *Department Funds.*—A memo. of 21st December regarding the funds of the Scientific Department was to be recorded. It stated that an advance of Rs.9,000 had been made to the funds of the Department from the general funds of the Association in the beginning of 1909; and it was estimated that at the end of the year there should be a balance in bank at credit of the Department account of about Rs.4,000. The Committee now decided to sanction the treating of the advance of Rs.9,000 as a contribution to the Department funds; and it seemed to them that it might be advisable, so far as the making up of the deficit on the working of the Department in future years was concerned, to draw first on the accumulated funds of the Association, and ultimately it might be necessary to increase the subscription of members to the Association: this, however, was to be left for decision by subsequent Committees.

(b) *Mr. C. B. Antram.*—A letter of 27th December from Dr. Hope was read; it forwarded a letter received by him from Mr. Antram, the Association's Entomologist, applying for leave home during 1910. Mr. Antram had originally applied for leave during 1909 but owing to the changes in the staff of the Department it had not been possible to sanction his leave then. It was explained that under his agreement Mr. Antram was entitled to leave either in 1909 or in 1910, and it was accordingly agreed to give him six months' leave from either 1st April or 1st May, whichever date would be most suitable from the point of view of the work of the Department.

Extract from Abstract of the Proceedings of a Meeting of the General Committee held on the 11th January 1910.

Present:—Mr. McMorran (*Chairman*), Mr. G. Pickford, (*Vice-Chairman*), Mr. H. W. Carr, Mr. W. M. Fraser, Mr. C. D. Inglis, Mr. W. Warrington, Mr. H. B. Whitby, Mr. R. L. Williamson, Mr. D. Youngson.

Proceedings.—The proceedings of the last meeting of the General Committee, held on the 28th December 1909, were confirmed after previous approval in circulation.

Correspondence with the Indian Tea Association (London).—Letters of 17th and 24th December from the Secretary, Indian Tea Association (London), were ordered to be recorded. The principal subject dealt with in them was as follows:—

Proposed Labour Rules.—Two draft agreements drawn up for use in the Brahmaputra and Surma Valleys, respectively, had now been received by the London Committee from the Indian Tea Association, Calcutta. These agreements had been for some considerable time past the subject of discussion and correspondence between the London Association, the Assam and Surma Valley Branches and the Calcutta Committee, and the position was that the forms of the agreements had been finally settled so far as India was concerned, and had been forwarded to the London Association for disposal there. Sir James Buckingham now mentioned that his Committee had had a special meeting to consider the agreements and the points which had been raised in the course of the discussion regarding them. The forms were then approved and it was agreed to have them printed and circulated among pro-

prietors in London for signature. Subsequently he would have copies sent to Calcutta for signature by proprietors or agents who have not signed in London.

The General Committee noted with satisfaction that good progress was being made towards having the rules adopted.

Tea in Burma.—The Committee addressed an enquiry some time ago to the Government of Burma with reference to the trade in tea between the Northern Shan States and Burma, and there was now to be recorded a reply dated 23rd December from the Revenue Secretary. He forwarded for information a copy of a letter from the Financial Commissioner submitting a note on the matter by the Superintendent of the Trade Registration Department. It appeared from the papers that tea is extensively cultivated both in British territory and in the adjoining foreign countries of Burma. The tea is used in two forms, dry and wet pickled, the latter form being the principal article of trade in the Northern Shan States. The transfrontier imports into Burma during 1907-08 were 3,866,952 lbs. of dry tea and 16,359,878 lbs. of pickled tea, almost the whole of which was consumed in Burma. Samples of dry and of pickled tea were forwarded to the Committee, and it was mentioned that the prices of the dry tea in Rangoon and Mandalay varied between three annas per lb. to more than eight annas per lb., the price of the wet pickled tea being from two to three annas per lb. The Financial Commissioner mentioned in his letter that dry tea was now to be found in every bazaar in Burma and that some years ago an enquiry had been made as to whether it would be profitable to have tea imported from Assam in small boxes, but that he had been informed that the Burman preferred Shan tea.

The papers and samples may be seen at the Office of the Association by any members interested.

Foreign Tea in India.—The Committee had also made an enquiry in connection with the consumption of foreign tea in India, and with a view to ascertaining for what trade the bulk of such tea is imported they had communicated with the Calcutta Tea Brokers' Association. A letter of 4th January from that Association now stated that they were unable to obtain any information on the subject.

The Committee decided to address the Collector of Customs, Bombay, into which Presidency the great bulk of the imported tea is taken.

Scientific Department.—*Blister Blight and the export of Tea Seed.*—A letter of 3rd January from Dr. Hope in his connection was to be recorded. It was in reply to a reference made to him by the Committee in regard to the possibility of Blister Blight being carried by tea seed. This enquiry had been made as the result of action taken by the Government of Ceylon, who had decided to allow the importation of seed only if accompanied by a certificate from a Scientific Officer of the Association that the seed did not come from a district infected with Blister Blight, or if so imported as to admit readily of disinfection.

In his letter, Dr. Hope replied that the blight infection might be carried with tea seed but pointed out that as a matter of fact seed had been exported from the Indian tea districts to Ceylon for many years and in considerable quantities, and that although during that time the blight had been a recognised disease in Upper Assam, from which much of the seed came, it was still unknown in Ceylon. The assumption therefore was that although possible, infection in the manner indicated was not likely to take place. In the same way, Dr. Hope added, tea seed had been imported into Darjeeling for many years and until the preceding year the blight had been

unknown there. With regard to the action taken by the Ceylon authorities Dr. Hope pointed out that there need be no fear of infection from seed from any of the tea districts other than Upper Assam and Darjeeling: he recommended, however, that in case of need all seed exported from these districts should be disinfected before being sent away from the district, and that it should be packed in sand, sawdust or burnt earth.

It was agreed to send copies of Dr. Hope's letter to those firms who had addressed the Committee with regard to the subject.

The General Committee noted this information with much satisfaction.

Meeting of Representatives from Tea Districts with General Committee.

—At the Annual Meeting of the Assam Branch held on the 30th November 1909, the Chairman of the Branch referred to the desirability of arranging a meeting between representatives of the tea districts and the General Committee at the time when these representatives came to Calcutta for the half yearly meeting of the Indian Tea Cess Committee. The General Committee had cordially approved of this suggestion, and it was now agreed to invite the members of the Tea Cess Committee who are expected in Calcutta from the Assam and Surma Valley Branches and from the Dooars Association to attend the meeting of the General Committee to be held on the 25th January, the day before the Tea Cess Committee meeting, in order that a discussion might be held in regard to the policy which it is considered desirable should be pursued by the industry in regard to labour questions.

Quality of Tea Dust.—A letter of 7th January from the Collector of Customs, Calcutta, was considered. It forwarded a sample of a consignment of tea despatched to Burma, the consignment weighing 784 lbs., having been valued at Rs.70. As the tea was of very poor quality the valuation, for statistical purposes, appeared to the Collector to be open to question, and the opinion of the Association on the subject was invited. The Committee inspected the sample and considered that, while the tea was obviously largely mixed with stalk and very much out of condition, it might realise in the bazaar the price put on it. A reply in these terms was to be sent to the Collector.

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Termes Gestroi.

OFFER OF A REWARD WITHDRAWN.

The *Agricultural Bulletin of the Straits Settlements* remarks:—

A reward of five thousand pounds was offered in April 1909 for the best method of exterminating the destructive pest, *Termes Gestroi*, in plantations. The difficulty lay in reaching the underground nest from the tree attacked with any smoke or liquid which would reach and destroy the insects in the nest. . . .

As might be expected a considerable number of applications were sent in from all parts of the world. In many cases, ordinary insecticides were recommended or methods in use for destroying other species of termites were suggested, the applicants having had no acquaintance with the *Termes Gestroi* or its somewhat exceptional habits. In one or two cases even magical processes were advised. A number recommended the use of a machine which had for some time been in use in the Peninsula and had been invented elsewhere, and which is more or less effective, but was of course not a new invention in the sense that was required.

The applications were carefully considered by the Committee and it was decided that none were suitable for the reward, which has now been finally withdrawn.

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The Indian Tea Duty.

Information has come from the Madras Government that the Government of India regret their inability to entertain the suggestion of the U.P.A.S.I. that the duty on all tea imported into India may be raised to four annas a pound. "They consider that the imposition of a protective duty on tea would be opposed to the principles on which the Indian tariff is based."

Ceylon has such a duty, but, unfortunately, the principles on which the Customs tariff is based vary greatly in different parts of the British Empire. Thus it comes about that India is refused a safeguard that is not withheld from Ceylon; a safeguard against being made a dumping ground for all manner of rubbish, imported under the name of "tea" and probably often used to "blend" with the genuine article before passing to the consumer.

A Useful Leguminous Plant.

Among the leguminous plants now under cultivation for seeding purposes on behalf of the U.P.A.S.I. is one named *Tephrosia purpurea*. Dealing with this recently as regards its suitability for the purpose of keeping down weeds in rubber and coffee cultivation, *L'Agronomie Tropicale* observed:—

"For some time, the investigations of physiologists and agriculturists have called attention to the disadvantages of weeding (in rubber and similar cultivations), but changes of method in this direction have not been adopted by many planters; few experiments have been undertaken in connection with it in the truly practical sense.

"Interest has, however, been awakened, and experiments with leguminous and other plants have been made to a certain extent everywhere. There have been attempts in many regions, to introduce a plant which, while capable of keeping down others which are harmful, enriches the soil and does not do any harm to such trees as rubber. According to a planter in the Federated Malay States, *Tephrosia purpurea* fulfils this purpose admirably. This *Tephrosia* grows slowly at first, but toward the end of four months it attains the dimensions of a small bush; it then commences to show superiority over other plants. When fully grown, it is 9 to 11 feet high. In plantations, it forms hedges across which no other plant can pass, and the necessary weeding near the plants costs little. The hedges are sufficiently distant to allow the air to circulate between the trees, and the soil is always well shaded and kept in good physical condition. As for the protected trees, these appear to make as good growth as they do on soil that is completely and regularly free from weeds.

"By growing the plants of *Tephrosia* in hedges, a better circulation around the roots is assured and the inspection of the protected plants is facilitated; other methods of cultivation have their advantages, however, as, for example, that in which each rubber tree is surrounded by *Tephrosia*.

"The plants attain a certain height, and should be cut once or twice a year; but this development gives them an advantage in combating lalang and other tall weeds, and as they do not climb, they may be planted without inconvenience near rubber and coffee trees. In addition, *Tephrosia purpurea* is a plant which enriches the soil, has few natural enemies, is very hardy and propagates itself when it is once established."

The account went on to show how a great saving in the expense of weeding follows the adoption of this plant in rubber cultivations.

The Scientific Officer.

Mr. Anstead is touring in Travancore- Planters who wish to ask for his advice or assistance are requested always to kindly address him under care of the Secretary, U. P. A. S. I., Bangalore. Letters will then be entered in the office register; extracts or full copies will be forwarded to the Scientific Officer when the subjects referred to are such as he can deal with while away from head-quarters; and the original letters will be filed so as to be available for reference by him after his return. This system will give every planter the assurance that his letter will not be mislaid (after it reaches the U. P. A. S. I. office), as might easily happen if the original were sent on by post, perhaps to follow the Scientific Officer from place to place. It will be the simplest and most convenient for Mr. Anstead himself. It will also afford the U.P.A.S. I. the best means of keeping complete records. For the Scientific Officer will send his notes to the Secretary, and they will be published in due course in this paper, of which files are maintained in the U.P.A.S.I. office.

When letters contain private matter or it is desired that they should be sent on, unopened, to Mr. Anstead, a note should be made on the cover, such as "private" or "to be forwarded."

The Weekly "Planters' Chronicle."

In reply to inquiries made by Hon. Secretaries of certain District Planters' Associations it may be stated here for the information of all planters that:

The weekly will be sent free, as the monthly was, to every member of every District Planters' Association affiliated to the U. P. A. S. I.; and, subject to reasonable limits, to Honorary Members and to those District Officials to whom copies of Proceedings have been usually sent by these District Planters' Associations.

If Proceedings are printed separately, they will be charged for according to the old scale of rates: if only printed in the "P. C.," they will be inserted free of charge.

Separate copies of Proceedings or other matter can always be supplied if ordered when the MS. is sent in.

It may be added that the price of a single copy will be 4 annas; the annual subscription Rs.10, including postage to any place in India or Ceylon. Rates for planters' short advertisements are unchanged; but these will apply in future, as was intended in the past, only to private advertisements, not to "trade" announcements such as offers of seeds, &c., for sale.

Reports of experiments, cultivation of "new" crops, and season prospects are earnestly solicited; as also is Correspondence relating to all planting matters. Contributions of this kind would tend to enhance very considerably the interest of the publication for the community generally.

Scientific Officer's Papers.**XV—THE HARMFUL EFFECT OF GRASS IN CULTIVATIONS.**

I have on several occasions, when discussing the use of weeds in cultivations of Tea, Coffee &c., had occasion to point out that grass of all kinds is directly harmful, and should be eliminated as far as possible, on account of its power of excreting a poisonous substance into the soil. An interesting article on the subject by Mr. Spencer Pickering appears in the *Gardeners' Chronicle* of December 18th, 1909, from which the following extract is taken:—

“The subject has been under investigation at the Woburn Experimental Fruit Farm for the last 15 years: one report (the third) dealing with it was published in 1903, and it is hoped that another will be issued before very long.

“Although no final solution of the problem has yet been obtained, considerable progress has been made in the matter, and various possible explanations have been definitely negatived. Foremost amongst these is the theory that the action is due to the grass absorbing all the food and water from the soil. The original experiments are, perhaps, the most striking, though not the most precise, on this point. A large number of Apple trees were planted in rows, 11 feet apart, in 1904: the ground in one row was kept tilled, and that in the other row laid down to grass; the grass when cut, is left to rot on the ground, and the same amount of manure is given to both rows of trees. Those in the tilled soil are now such large trees that half of them have had to be removed, their spread being some 15 to 16 feet; those in grass did not grow at all for several years, and only began to make growth when their roots extended beyond the grass area, they are still miserable specimens of trees, about one-sixth the size of the others, and the crops borne by them have only been about one-tenth of that of their neighbours. Yet the grassed soil is actually richer than the tilled soil. In the 15 years it has had removed from it only one crop of grass (that actually growing at any given moment), and the small amount of material required for the stunted growth of the trees; whereas, from the tilled soil there has been removed material for an annual crop of fruit, and also for the vigorous growth of the trees. Analysis also shows that the grassed soil is the richer of the two, and it also shows that, in this particular case, there is practically no difference between the water contents of the grassed and open plots.

“Of the many other experiments on these points, the most conclusive are, perhaps, those made with Apple trees grown in pots: In some of these the grass roots were separated from the roots by very fine wire gauze, through which the former could not penetrate, the pots were weighed and watered every two days, so as to keep the water contents the same, and such water and food as was added, was introduced from below, so that the tree should have the first pull at it. Yet the trees still suffered badly from the grass, although the soil was actually moister and richer than in the case of similar trees without grass. Corresponding experiments have been made with trees planted in the open. Though increase of moisture up to a certain point, and increase of food in certain cases, may benefit the trees, the benefit is much too small to do more than very slightly diminish the deleterious effect of the grass.

“The behaviour of a tree in grass is clearly a case of starvation in a land of plenty, and this cannot be explained by supposing (untenable as such a supposition is for other reasons) that the grass roots suck up whatever nourishing solution there is in the soil, leaving none for the tree roots. The pot experiments, just quoted, effectively negative this. Nor can we explain.

the matter by supposing that the tree was only temporarily affected by the grass, but, being in a weak state after transplanting, this check resulted in its becoming permanently stunted; for a precisely similar, and even more marked effect has been proved to be produced by grassing over trees which have been established, in one case four years and in another case for 12 years; the effect, indeed, was so great that, in the first instance, many of the trees have been killed, and in the second instance, a similar result appears imminent.

"Other explanations which suggested themselves have been investigated, and found equally unacceptable: these were differences in soil temperature, difference in aeration or proportion of carbon dioxide, and difference in physical condition of the soil. The only other explanation which appears to be possible is that the growth of the grass results in the formation of some substance which is poisonous to the tree.

"This may be an active poison—a toxin—or the poisonous action may result from an alteration in the proportion of various substances present in the soil. An active poison may be produced in various ways, such as by the decomposition of the debris of the grass, or as a product of the bacteria present in the soil.

"If the formation of a toxic substance is the explanation of the grass effect, we might naturally expect great variations in this effect in different soils: and this is certainly the case. At Ridgmont the effect is, perhaps, greater than in any other instance which has come under the writer's observation, but cases of very nearly the same intensity have been found in various parts of the kingdom, whilst only one instance has been noticed where the grass, apparently, had no effect. This variation in intensity with the nature of the soil is, probably, the chief reason why the action is not more widely recognised; but two other causes contribute to an under-estimation of the grass effect, the one that it is very rare for a plantation to be partly grassed in such a way as to give satisfactory evidence as to the bad effect of this grassing, the other, that the grassing is generally effected gradually, extending throughout several seasons, and in that case, it has been found, the effects are far less marked than they otherwise are, the trees apparently, becoming gradually adapted to the altered conditions."

"No definite connection has yet been found between the nature of the soil and the intensity of the action, but it does not appear to be governed by the richness of the soil."

Grass soon takes possession of untilled land, and semi-abandoned Coffee. It often happens that a strip of Coffee by the road-side becomes grassed over, and is then abandoned; the grass spreads gradually inwards, and kills out the Coffee as it spreads. It is more than probable that this is what has killed out Coffee which has been neglected and uncared for.

RUDOLPH D. ANSTEAD, *Planting Expert.*

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The British Board of Trade returns for the year 1908 show the remarkable expansion of 18½ million pounds in deliveries for home consumption and export, the former having increased by 8 million pounds and the latter by 10½. The total, however, of all tea imported during the same period was 19 million pounds over that of 1908, and stocks therefore are slightly augmented. While the increase in the crops from India and Ceylon reached a considerable weight, the market has not been appreciably affected and the extra supplies should be absorbed without the average price of tea being unduly disturbed.

Notes and Comments by the Scientific Officer.

7.—*Wash for Green Bug*.—Mr. A. G. Nicholson, of Coonoor, has most kindly sent me, for publication, the details of the improved wash he is now using to keep the Green Bug on his coffee in check. It will be remembered that Mr. Nicholson's old mixture was:—

1 lb. of Sunlight Soap	} to a kerosine tinful of water.
1 lb. of Rosin	
1 lb. of Soda	

This has been cheapened and improved upon. Mr. Nicholson writes: "I now use Gossage's Mottled Blue Bar Soap, Rs.15/8 per case from Messrs. Peirce, Leslie & Co., Calicut, instead of Rs.26 or Rs.28 for the same weight of Sunlight Soap, with rather better results. I use refined Saltpetre instead of Crude Saltpetre, or Washing Soda. This refined costs Rs.190 per ton against about Rs.90 for the Crude Saltpetre, or Soda, but by using it I am enabled to drop the Rosin altogether, which is one of the most expensive items, costing 10s./6d. per cwt. c. f. i. Calicut."

This makes the new mixture:—

1 lb. Gossage's blue bar soap	} to a kerosine tinful of water.
1 lb. refined saltpetre	

This mixture works out at about 4 to 5 pies per kerosine tinful, according to the cost of carriage to the spot, and "does not injure the foliage." Mr. Nicholson continues:—"I have been also experimenting with various soaps provided by the Vermisapon Specialities Co., Coimbatore, and they have prepared a soap which is practically as destructive to the Green Bug as my mixture, but I do not know exactly what the cost is. Their mixtures have ranged from 4 to 6 pies per kerosine tinful of solution."

Referring to the method of application, my correspondent says: "I am now rubbing the whole tree down, and brushing, not only the green portions as before, but the whole of the affected tree from the ground to the tips of the branches." If this brushing has to be done in damp, uncertain, weather, a mixture which does not wash off easily, and which at the same time is cheap and effective is made by dissolving 1 lb. soap in a kerosine tinful of water and adding 10% of the bulk of liquid fuel.

In discussing the merits of the new mixtures described above, Mr. Nicholson raises a very interesting point indeed, which is worth careful investigation. He says, referring to the mixture, "It has also certain manurial value in starting the nitric ferments in the soil, and as its practical results are so much greater than are warranted by its own manurial value, I think it may prove to be also destructive to the inimical bacteria in the soil."

Our thanks are due to Mr. Nicholson for his most interesting letter and for the way he has placed the results of his valuable experiments at the disposal of the planting community.

RUDOLPH D. ANSTEAD, *Planting Expert*.

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Mr. Vice-Consul Milligan, reporting on the Trade of Switzerland for the year 1908, states that China Tea still appears to be more popular in that country than Indian Tea; the imports of the former amounted to 245 tons, as against only 132 tons from British India.

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It is reported from Ceylon that the latest development connected with tea machinery is that of drying tea by gas. The advantages claimed are saving in fuel, absolute cleanliness, simplicity in working, and thoroughly fired tea.

RUBBER.

Two Instructive Books.

Planters will probably read with interest the following extract from the London *Economist*, giving a review of two instructive books, viz., "*Le Caoutchouc*," by Amedée Fayol; and "*Sur l'Avenir des Plantations de Caoutchouc*," by Albert Murat. This review deals in great measure with the manufacturing side of the rubber industry, and for that reason possesses special value for the producer who wishes to study something beyond his own aspect of a staple whose future is of moment to him.

"No European can claim to have discovered the uses of rubber. When, Columbus first visited America, he found the Indians wearing primitive mackintoshes and galoshes. Since they were made of the raw and sticky gum, by nightfall each Indian must have collected on his person samples of all of his day's occupations. During the latter half of the eighteenth century the gum was exhibited from time to time in France as a curiosity. D'Herissant discovered that it was soluble. The famous chemist, Priestley, studied its properties, and first recommended it as an eraser. At the opening of the nineteenth century a few tentative efforts had been made both in England and France to employ it in water-proofing materials, and for boots, tubes, and dolls. But it was not until the twenties that the true industrial development of the gum began, and it was Macintosh of Glasgow who began it. He discovered how to make thin India-rubber sheet, and how to incorporate a textile material with it by means of a solution of rubber in naphtha. His name became a household word, now obsolescent; but a name which deserves even more to be associated with the rubber industry is that of Goodyear. His discovery in 1839 of the process of vulcanisation has been the foundation of the modern industrial developments of rubber. Before him, the stickiness of the raw gum and the way it melted in the heat were a great drawback to its use, as in the case of the Indians' galoshes. In seeking to remedy these defects, he tried mixing the gum with all sorts of substances and heating it. One day he tried sulphur, and the thing was done. When the mixture was heated it changed. Whilst retaining its elasticity and impermeability it lost its stickiness and its liability to melt and dissolve. Using more sulphur in the mixture, he obtained vulcanite. This is the process of vulcanisation by sulphur, which is now universally employed to make commercial rubber out of the raw gum, just as iron is heated with carbon to make it into steel. After Goodyear's discovery, the development of the material went forward rapidly. It is curious to notice that in 1845 Thomson invented and fully described the pneumatic tyre, with inside and outside rubber tubes and a valve; but the world was not ready for the invention, and it was forgotten until its rediscovery by Dunlop in 1888 started the present enormous development of the rubber industries. . . .

"Such an outline is the commercial history of rubber. The story is told at greater length by M. Fayol in a well-informed and well-arranged monograph, "*Le Caoutchouc*," in which he has collected all the facts relating to the history, properties, technology, and manufacture of the gum. The comprehensive view of its subject given by the book should make it useful to merchants and manufacturers. That large section of the public, too, which has recently begun to take an interest in rubber, though rather as a financial counter than as an industrial fact, may find such a work of interest, to clothe the abstraction of the share lists with reality, and to tint it with a little local colour. The investor who knows of fine hard Pará only as a thing with a price will be surprised to learn that there is no single rubber plant. Many hundreds of genera and many thousand of species yield rubber. They vary

widely in type, from the King of them all, the Hevea, of Brazil, a giant forest tree, to the rope-like lianas of the Congo. Each part of the equatorial regions of the globe has its own sort. The strangest is that of Asia, the *ficus elastica*, a poor yielder, which has the timid habit of dropping roots down even from its topmost branches, to make quite sure that the earth is still there all right. Commercially and physically, the palmlike Hevea is king; and it is this genus which is being principally cultivated by the new companies in the plantations. Wickham sent the first seedlings from Kew for artificial cultivation in Ceylon in 1896; and in his pamphlet, "*Sur l'Avenir des Plantations de Caoutchouc*," M. Albert Murat now estimates that the number of trees planted in Ceylon, the Peninsula, and the Islands amounts already to fifty-one and a half millions.

"Rubber, we learn from M. Fayol, is not a sap, it is a secretion. It is not the blood of the tree, it is rather its milk; and it closely resembles milk when it trickles from transverse gashes in the bark into the little pots stuck on below to catch it. It is then a thin liquor, which has to be coagulated for transport. The process of coagulation is still imperfectly understood, and for the most part imperfectly carried out. It can be done by heat, or chemicals, or both. In Brazil a warm lump of clay is fixed to the end of a stick, and dipped into a hot cauldron of the gum. When it is taken out a thin skin coagulates on on the surface of the clay, and the operation is repeated till the coagulated skins make a big lump. The lump is split to get it off the clay, and thus is produced the stratified hollow form of a piece of crude Pará. The natives of Africa employ less pleasant means of coagulation. . . .

"Several problems of great importance remain to be solved in connection with the technology of rubber. The most vital of these is how to prevent the slow oxidation which the material undergoes in the air, which robs it of its elasticity and impermeability, and makes it brittle and hard. Another difficulty is that rubber, which is the best of all insulators, is particularly badly affected by contact with copper, which is the best of commercial conductors. The metal has an effect upon it similar to that of the oxygen of the air, but worse. In the production of the raw material, the principal need is a better method of coagulating the liquid latex, and of eliminating moisture on coagulation. Improvement in these directions can only come with a better comprehension of the chemistry of the material, and of the part played in its composition by certain albumenoids similar to those found in milk. In the fresh latex the rubber itself is in suspension in globules, floating in a solution containing the albumenoids. It can be coagulated as butter is coagulated, by breaking up the globules, so that they adhere to each other; or it can be coagulated as cheese is coagulated, by doing something with heat or chemicals to solidify the albumen. Butter-coagulation gives the purer and stronger product, because the perishable albumenoids, which only weaken the material, can be drained off. But at present that is a laboratory process only, and it is cheese-coagulation that is actually employed, the albumenoids being solidified round the rubber globules by heat or an acid. To devise some means of using butter-coagulation as a commercial possibility will perhaps be the next step forward in the development of rubber. It was Faraday who first explained the principles of coagulation, and if, as M. Fayol tells us, the problem is now receiving attention from many experts, his pioneer work may be destined to receive yet another practical application."

Rubber Culture in the Far East.

Mr. John C. Willis, M.A., Sc. D., writes in the *India Rubber World* :—

The history of rubber culture in tropical Asia dates from 1875, when the authorities at Kew succeeded in convincing the Government of India

that there were indications of a shortage in rubber supply, as there had been in regard to cinchóna about 15 years earlier, and that it would be wise to get the rubber plants of South America established elsewhere. An expedition was sent, at the expense of the Indian Government, to the valley of the Amazon; and succeeded in collecting, among other things, seed of the so-called Pará rubber, *Hevea Brasiliensis*. These were grown at Kew, and in 1876 the young plants resulting were sent to the East in Wardian cases in charge of a special gardener. The bulk of the plants came to Ceylon, it having been decided that India had no botanic garden in a suitable climate, but a few went to Singapore and elsewhere.

A special branch botanic garden was opened in Ceylon, at Henaratgoda, near Colombo, to receive the rubber trees, and about 50 were planted there, the remaining 20 being planted at the chief garden of Peradeniya near Kandy, at an elevation of 1,600 feet above the sea, which has on the whole shown itself to be rather too great a height for rapid growth. About 1881 and 1882 the plants began to flower, and a few seeds (and cuttings) were distributed, at first to other botanic gardens, and then to planters in the island who had expressed willingness to try the new cultivation. It is from these seeds or cuttings that the few old trees on such estates as Culloden in Ceylon have sprung.

Very slow progress was made in this way for the next 16 years, but in 1888 the late Dr. Trimen, Director of the Ceylon Botanic Gardens, began to tap the largest of the trees. V-shaped incisions were cut with a hammer and chisel, and the milk was allowed to trickle down the stem into a channel made around the base by sticking on a strip of mud, and from this channel it ran into cocoanut shells, where it was simply allowed to dry, and formed a lump of blackish rubber. The tree was tapped once a week for about eight weeks, then given a rest, and again tapped after a few months. It was tapped every second year, and in nine years had given 13 pounds 6 ounces of dry rubber, or an average of $1\frac{1}{2}$ pounds a year. Now this tree was 12 years old when the tapping began, and a yield of $\frac{1}{2}$ -pound, at the then price of a little over two shillings (50 cents), was not enough to make the cultivation profitable, the more so as this tree was the largest of all, and of a size that most trees only reach in 13-16 years.

In this condition we found the question on taking up the direction of the Ceylon gardens in 1896, and, feeling convinced that there was a future before rubber, we commenced detailed experiments in 1897. Tapping a large number of trees, so as to get an average result, we found that about 100 pounds of dry rubber might be expected from an acre of trees 10 years old. This at two shillings a pound was enough to show a fair profit, and people began to take up the cultivation from that time.

One of the most important results of these experiments was the rediscovery of a fact known to the natives of the Amazon, and which is known in the east as "wound response." At later tapplings near to the first the tree yields more milk than at the first bleeding. It is true that this milk is less concentrated so far as the amount of rubber in it is concerned, but it runs so much more freely that more rubber is obtained. This showed clearly the reason of previous unfavorable reports on rubber trees and their yield. Either only one tapping had been made, or the tapping had not been sufficiently frequent to show the wound response. Mr. Parkin, who was in Ceylon in 1898-99, carried out detailed experiments on wound response and fully established the regularity of the phenomenon.

Mr. Parkin also worked out the method of preparing biscuit or sheet as in vogue in the east to the present day. The active constituents of the

smoke used in South America having been shown to be acetic acid and creosote, Mr. Parkin showed that the best results were obtained by heating the milk to something over 150 degs. Fahr., and coagulating with the calculated quantity of acetic acid in presence of creosote. Planters generally have considered the heating and the creosoting too much trouble, but the making of biscuit or sheet by the aid of acid is most common. Some people allow coagulation to go on naturally by leaving the milk to stand, but this of course simply means that the acid is formed in it by putrefaction. Recently Mr. Kelway Bamber has shown that the heating of the milk destroys the enzyme which it contains, producing a biscuit of the lightest colour and one which does not subsequently darken. Good rubber produced in this way has obtained higher prices, and many estates now heat their milk.

The biscuits obtaining a higher price than the raw rubber dried in cocoanut shells, and the price of rubber rising generally, the industry now began to be rapidly taken up, and there was a great run on the few seeds available in the botanic gardens of Ceylon and of Singapore, where also rubber cultivation was being pushed. Seeds were sold at auction, and in one year realized \$10 a thousand. In the course of the following five years, seed began to come in from the trees in private hands, and in annually increasing quantity, until now it is a drug in the market, and proposals are under consideration to crush rubber seeds for the useful oil contained. The price of rubber now began to rise, and it proved that the return could be obtained in less than 10 years, and a greater rate than 100 pounds a year, so that the cultivation proved to be extremely profitable.

The biscuit or sheet form adopted for the eastern rubber, and its clear colour and cleanliness, have caused it to meet with great favour, and it has sold at higher prices per pound than the best Amazon rubber. This is often supposed so mark a real superiority, but in reality it does not, for it takes ten pounds of the South American rubber to equal eight of cultivated in the actual contents of caoutchouc, and consequently the former is really obtaining the higher price. Why the cultivated rubber should be somewhat lacking in strength and tenacity as compared with the wild is one of the greatest problems of the day.

Experiments were conducted by the writer and Mr. Kelway Bamber, preparing biscuit without drying, compressing the newly coagulated rubber into a solid mass. In this way a block rubber was turned out resembling the South American, with about 10-12 per cent. of water contained in it, and this has been favourably reported on by several manufacturers. Other people think that age of the tree is mainly responsible for the greater strength of South American rubber, but various experiments go against this view.

It was not long before tapping by means of a hammer and chisel was given up in favour of tapping by knives, usually of the type of a plane. Given a certain amount of bark on the tree, it was obviously necessary to make that last as long as possible, and tapping in V's by chisels was very destructive, so that a given place would not be healed up by the time that one wanted to operate on it again. Herringbone or spirally running cuts came in, and the wound response was obtained by shaving off the under side of the old wound. If the sideways-sloping cuts be made about a foot apart, and only one side of the tree be tapped at once, it is found that new bark has fully formed by the time that one returns to the cuts first made.

The early method of producing the rubber in little biscuits is also being superseded by the use of machinery for turning it out in the form of crêpe or in other ways, and the biscuits, sheet or crêpe are very often compressed into block rubber, which suffers less from oxidation.

As an indication of how rapidly the new industry is growing, the figures of export from Ceylon may be quoted:—

1901	...	...	...	...	66 cwt.
1902	...	...	...	...	189 "
1903	...	...	...	...	389 "
1904	...	...	...	...	676 "
1905	...	...	...	...	1,401 "
1906	...	...	...	...	3,705 "
1907	...	...	...	...	7,093 "

To turn now to other countries in the east, the one which has shown itself to be on the whole the most favourable of all is the Federated Malay States, a British protectorate lying north of Singapore. The growth of rubber there has been decidedly better than in Ceylon and at the same time coffee, the only other planting industry of importance, has been lately in a very unprosperous condition. The country, unlike Ceylon or Java, has vast areas of undeveloped forest land, which is of all others the best suited for rubber. Under these favouring circumstances the industry has progressed very rapidly and the Malay States are by far the largest exporting country. . .

Java is handicapped like Ceylon by very large existing industries which take up most of the available land, but on the other hand has a great advantage in unlimited and very cheap labour, while the trees grow very well indeed, and there are not wanting indications that Java will some day be an important producer of rubber. . . .

To turn to India, experiments with *Hevea* in the north have failed, but a considerable area is now planted with this tree in the Southern part of the Madras Presidency. Growth is apparently slower than in Ceylon, but there are great advantages in regard to plentiful and cheap labour.

At the time of this writing, it is probable that about 400,000 acres in tropical Asia are planted with *Hevea Brasiliensis*. This means in the course of the next seven or eight years a production of about 40,000 to 50,000 tons of clean rubber, or a good deal more than half of the world's present total production. Add to this the fact that during the present boom rubber companies are being floated almost daily, that tropical America and Africa have a fair amount of rubber planted, that it is improbable that the wild rubber of South America will be driven off the market for a long time to come, and that there are also considerable areas planted in other kinds of rubber, and it is evident that it will not be very many years before rubber is cheap and new uses for it may begin to arise freely.

A word of mention in conclusion in regard to other rubbers. *Castilloa elastica*, so largely planted in Mexico, has been given up in tropical Asia on account of its uncertainty. It is by no means easy to persuade the tree to grow well all the time. It may begin well and then fall off, or *vice versa*. The amount of rubber given by tapping is very variable, and there is no wound response.

Manihot Glaziovii, the Ceará rubber, grows like a weed all over the East, but has never given a large enough yield to be much taken up. In quality this rubber, when made into biscuit or sheet, is decidedly superior to the best plantation *Hevea*. Recently Ule has discovered three new rubber-yielding species of *Manihot* in Brazil—*M. heptaphylla*, *M. dichotoma*, and *M. piuhycensis*. These are said to give much larger yields than the old Ceará rubber tree, and already have been largely planted in Ceylon, where *Manihot* is found to do better than *Hevea* at high elevations or in the drier parts of the island.

TEA.**New York Market in 1909.**

A trade review states that, taken all through, the year's business in the New York tea market was decidedly good. At the beginning, in January, the position was a strong one. There had been a period of activity, local stocks were light, and from natural causes the primary and foreign markets were advancing. Some amount of unsettlement, however, had arisen for importers and brokers owing to the uncertainty arising from the discussion upon tea by Mr. Payne's House Committee preparatory to formulating the new tariff act. This resolved itself in a definite proposal to reimpose a duty on tea to help the revenue. For some months this aroused keen controversy in the tea trade, the ultimate result being that tea continued on the free list with coffee and other grocery articles. In view of the possibility of a tea tax, however, large quantities of tea were purchased and shipped to New York, and for a time this excess of stock above the immediate wants of the country, which still suffered from the depression and refused to take tea in any quantities save those for a hand-to-mouth consumption, threatened to overload the market. At the beginning of the year market prices, compared with those at the end, were :

	1909.	
	January.	December.
Good Formosas.....	14 a 14½	17 a 18
Foochow	14 a 15	14 a 16
Congou	12 a 14	12 a 14
India Pck. Souchong	12 a 12½	13 a 14
Ceylon	12 a 12½	14 a 15
Japan	20 a ...	20 a ...

Inferior grades of Congous were 9c. and 10c. a pound and now are quoted at 8½ a 9c. The better grades have been enhanced in price during the year. Japans, which went back, recovered, and Formosas, Indian and Ceylon have made a marked advance. The supply of good quality Formosas is the smallest ever known since Formosas have come to this market. . . . All through the summer there was an unusually good movement, the new teas being well received up to October, when the supplies becoming large and the holiday season approaching, the wholesale consumption demand fell off to quietness. The recession in prices was about 4c. from the highest speculative point reached and about 1c. to 1½c. from the average market value. On the whole therefore, prices show comparatively little advance. As it is fairly established that the abundance of stock in 1908 was so much greater than at the end of 1909 it becomes a fair deduction that prices are unlikely to recede much from those now ruling. Imports of greens and Japans have been in excess of the previous year, but yet show the unexpected position of being the strongest in price, while the supply of Fomosas is smaller than usual. Congous have decreased about 30 per cent. but at the end of the year are the weakest teas in price. There is comparatively little tea to arrive and consequently teas of quality are expected to harden. After the removal of the tariff uncertainty the market worked itself into a healthy condition. Surplus stocks were disposed of and the trade returned to a normal condition. The general position as regards price and stock seems to be such as to cause holders to ask firm prices, as they believe later on more activity may be shown and advanced rates will be secured. The entire situation seems to be a healthy one, the most important factor being that stocks throughout the country are small.

COFFEE.

Some Results of Valorization.

Reports of the fluctuations of Coffee in American markets are of interest to the Coffee planter in India only so far as they serve as a gauge of the general position. To print a review of the trade at New York during the year 1909 would, therefore, be superfluous; but extracts from a review of that trade are given below as showing some of the results of the Brazilian Valorization scheme.

After recording a steady advance of prices through the year, amounting in all to $1\frac{1}{2}$ cent ($\frac{3}{4}$ d.) per pound the review states, *inter alia*, that the situation is a complex one and it is by no means easy to analyze the part played by natural and artificial agencies in bringing about the present position. . . .

The Santos crop of the year, though a good one, fell short of preliminary extravagant estimates. Its quality, moreover, was not of the best. The bean, especially in the early samples sent to the United States, bore signs of immaturity and hasty harvesting. Indeed, the marketing of this Santos crop has borne out the conditions injurious to the interests of the coffee trade anticipated by the government of the State of Sao Paulo when it proposed in April to alter the existing Valorization Law. As had been foreseen, there was a rush on the part of the planters to market the crop so as to forestall the limitation of export when the quantity allowed to be exported before the imposition of the 20 per cent. duty reached the fixed quantity of nine million and a half bags. From July onwards the receipts at Santos from the interior were unprecedented and the shipments to the United States followed suit. . . . The exports, which in former years have been spread over the whole twelve months, have been compressed into less than five. Time has not been given to the planter to prepare his coffee properly. Coffee of poor grade has been marketed to the partial exclusion and depreciation of better qualities, and disorganization has been introduced in the coffee labor field on the plantations and in the shipping port, while the railway and shipping companies have been compelled to meet the new conditions at a loss to economical operation in freight transportation. . . .

Judging from the dullness of the country demand for these stocks, from the reports of reselling at interior centres, and from the fact that the direct shipments through New Orleans and New York have been enormous the "invisible supply" must at least be in no danger of exhaustion. It may be very large. The buying movement in the spring stimulated by the notion that coffee would be taken from the free list and a duty imposed on it, must have led to accumulation of great stores of coffee which have not yet been retailed to the consuming public so as to bring back country local stocks to their normal balance. The probability is that there is ample coffee to go round for a year, even allowing for the depletion of stocks during the past summer and the normal annual growth of population and consequent increased capacity for coffee drinking consumption put roughly at two per cent. per annum. Over all hangs the weight of 7,000,000 bags owned by the State of Sao Paulo, and now pledged for the redemption of the government loan to the banks of the international committee of seven. . . .

Crop conditions in Brazil and other coffee producing countries, both with regard to the past and new growing crop, seem so far to have favored the working out of the valorization plan so as to have maintained the price of coffee, an effect naturally to be desired by those bankers and coffee interests closely identified with the operation of the valorization law of Brazil. But this concerns the coffee option market much more than the spot market.

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The Renard Road Train.

Information received, indirectly, from Sir Roper Lethbridge, K. C. I. E. shows that the M. & S. M. Railway authorities have no present intention of establishing a service of Renard Road Trains in Coorg or Mysore. There is said to be no hope of their doing so for some years to come, so if planters consider that such a service would be useful to them it will be necessary to think of some other means of getting it.

Statistics of traffic, of as recent date as possible, and information concerning existing roads, their condition, character of gradients, &c., would be very useful. These are essential to the framing of estimates of revenue and expenditure.

Soil Bacteria.

In Sc. O's Note No. 7 in last issue Mr. A. G. Nicholson was quoted as having remarked concerning a mixture used as a wash for Green Bug:—"It has also certain manurial value in starting the nitric ferments in the soil, and as its practical results are so much greater than are warranted by its own manurial value, I think it may prove to be also destructive to the inimical bacteria in the soil.

Planters are not interested in sugar-cane cultivation, but it is a coincidence that, commenting on the use of "molascinder"—a mixture of molasses, ashes, scum and other residue of sugar-making—M. P. Boname noted in a bulletin of the Station Agronomique, Mauritius, recently, that the results on sugar-cane of the use of this fertiliser indicated a greater benefit than could be ascribed to the fertilizing constituents applied; and this increased benefit he attributed to the action of the molasses in promoting the activity of beneficial soil bacteria.

Mulches.

In a paper by an American writer reference is made to the extent of the loss of water from the soil under irrigation, and the use of deep furrows and granular soil mulches to reduce this loss is explained. It is shown as a result of tank experiments in different localities that "the deeper the mulch the less the evaporation, but there are practical considerations which limit the depth of soil mulches. A depth of less than 9 in. and more than 3 in. would meet the requirements of the arid region in general." Though planters are not greatly concerned with arid regions they may possibly take a hint from the above remarks, which may conjure up recollections of Dr. Lehmann's advocacy of mulching.

Scientific Officer's Papers.**XVI.—CATTLE MANURE.**

Cattle manure is one of the most valuable forms of manure that can be used. It is what is known as a complete fertiliser, *i.e.*, it supplies nitrogen, phosphoric acid, and potash. The following analyses show the average composition of a good cattle manure, made at Koilpatti Agricultural Station.

				Calculated to a dry state.	
Moisture	...	..	...	56.5	—
Organic matter	...	..	...	16.7	39.62
Nitrogen	...	..	...	0.53	1.26
Phosphoric Acid	...	..	...	0.34	0.79
Potash	...	..	...	0.99	2.35

Unfortunately good cattle manure is difficult to obtain, and the difficulty of feeding cattle in the dry weather is so great that the keeping of herds on purpose to supply manure for the estate is unpractical. Under these circumstances it is most important that such manure as is available from the few cattle kept on the estate, and from the stables, should be taken care of, and more care might be bestowed upon it with advantage.

Of the food which enters an animal's stomach part is digested, the constituents being used to form bone, muscle, blood, &c., and to renew the tissues which are constantly wearing out. There are two classes of waste products to be got rid of, one the undigested portion of the food which is excreted in solid form, and the other the waste products from worn out tissues which are excreted in various ways, one of which is as urine.

Care should be taken that this liquid portion of the manure is not lost. The quantity of plant food excreted in the urine is more than that contained in the dung. The relative composition of the dung and the urine vary very much with different feeding, but the following are average analyses given by Beal for American animals:—

	CATTLE.		HORSE'S.		SHEEP.	
	Solid	Liquid.	Solid	Liquid.	Solid	Liquid.
Nitrogen	...	0.29	0.58	0.44	0.55	1.05
Potash.	...	0.10	0.49	0.35	0.15	2.26
Phosphoric Acid	...	0.17	—	0.17	0.31	0.01

The urine therefore should be carefully conserved. Stable floors should be watertight, and made of cement if possible, and plenty of dry litter should be used to soak up the liquids. For this purpose fern, which grows abundantly in some districts, when dry is very suitable, and where this is not available rough grass can be used. Dr. Lehmann, in one of his reports, suggested the use of the rank grass which covers many of the hill tops in the Malnad for this purpose. Failing litter of any kind, dry earth should be used. The manure should be left to accumulate, and to be trodden down into a firm mass on the floor by the animals, and finally removed to the field from the stable.

When stored, cattle manure depreciates in two ways: owing to leaching by exposure to sun and rain, and owing to fermentation. The former can be, and should be, avoided, but some loss is bound to occur in stored manure due to the latter.

Fermentation is brought about by bacteria, which require air, and it can be checked by regulating the supply of air. The bacteria liberate carbon from the manure, which combines with the oxygen in the air to form a gas called Carbon dioxide, which escapes. Simple compounds of nitrogen are left which are further changed by other kinds of bacteria to form ammonia and nitric acid. When fermentation is too rapid the ammonia is formed in large quantities and escapes instead of being changed into nitric acid and combining with salts to form nitrates. The point to be considered is how to bring about the necessary fermentation to form nitrates with the least danger of loss.

Were it possible to do so, it would be much better to put out the fresh manure into the field straight from the stable. In the soil the conditions are very different to those in the manure heap: fermentation is gradual, and the mineral salts in the soil combine with the nitric acid to form nitrates as fast as it is formed.

If the manure must be removed from the stable, or cattle shed, to be stored it should be placed in watertight, if possible cement-lined, pits and trampled down tightly with a layer of soil placed on the top each day to exclude the air, and these pits should have shelters built over them to protect the manure from the rain during the monsoon.

Cattle manure made in this way will be far more valuable than when it is stored in heaps, exposed to weather, and allowed to ferment, and the liquid products allowed to drain away. In fact manure, made in the latter way is of very little use as a fertiliser, though it may supply humus to the soil and thus improve its mechanical condition.

The difference in value between cattle manure conserved in the proper way and that of which no care has been taken is well shown in some experiments carried out at the Koilpatti Agricultural Station, the results of which are given in the Annual Report of 1908-1909, where the following analyses appear:—

		Heap.	Pit.	Box.
Organic matter	... ..	37'22	39'62	54'91
Nitrogen	.. ..	0'78	1'26	1'94
Phosphoric Acid	... ..	0'5	0'79	0'95
Potash	... ..	1'33	2'35	3'59

In the heap the urine is lost; in the pit method the manure is stored in a covered pit into which the urine is allowed to drain and dry earth is occasionally thrown on it; in the box method the cattle are kept in a loose-box, the floor of which is sunk, and some 2 or 3 feet of well compacted manure is allowed to accumulate beneath the animals.

What has been said above applies also to the manufacture of composts of pulp and coolie line sweepings. Such composts are very valuable manures and should be made in watertight pits covered by a shelter.

The extra cost implied by this method of manure conservation is more than compensated for by the value of the manure and by the reduced cost of application, since a smaller quantity has to be applied per acre to supply the same amount of plant food. For instance, the manures, the analyses of which have been given above, contain the following weights of plant food per ton.

Organic matter	... ..	833'7 lbs.	887'5 lbs.	1,230 lbs.
Nitrogen	... ..	17'5 "	28'2 "	43'5 "
Phosphoric Acid	... ..	11'2 "	17'7 "	21'3 "
Potash	... ..	34'3 "	52'6 "	80'4 "

Thus one ton of the box made manure is equivalent to $2\frac{1}{2}$ tons of the heap made manure, and $1\frac{1}{2}$ tons of the pit made manure, in nitrogen value.

It will be seen from the analyses already quoted that though cattle manure is a complete fertiliser, it is somewhat lacking in Phosphoric acid. Its value would be much enhanced if this constituent was increased by adding to the manure, or compost, as it is being accumulated, a layer of bone meal from time to time.

Cattle manure when properly made and conserved is without doubt a most valuable fertiliser. It adds humus to the soil and promotes a good tilth, lightening stiff soil and increasing the water-holding power of light soil, and it supplies a mixed fertiliser of nitrogen, phosphoric acid, and potash. It is, however, essentially a nitrogenous manure, and like all nitrogenous manures it acts directly by increasing the wood and foliage.

It should be broadcasted, and if possible forked in. In the case of Coffee, forking is debarred because so many feeding roots, which in this crop are found on the surface, are cut in the process; hence the manure must be spread on the top of the soil, and so on the top of the feeding roots, and covered over with the existing mulch.

RUDOLPH D. ANSTEAD, *Planting Expert.*

Notes and Comments by the Scientific Officer.

8. *Flies*.—At certain seasons of the year flies are a source of great annoyance to horses and cattle, and the worry entailed on the animals results in a loss of weight, and in the case of cows a diminution of the yield of milk.

Experiments conducted at the Virginian Experiment Station proved that when worried by flies, the milk yield of cows fell off by as much as from 25 to 50%.

The best means of protecting animals from attack by flies is to wash over their carts with a mixture containing some material which is repellant to these insects.

A mixture of this nature, which was used in the West Indies with considerable success, is "Anti-Fly pest," to be obtained from the Cyphers Incubator Co., Buffalo, U.S.A. This was applied by means of a Climax Spray pump, the animals being sprayed twice a day. The cost of the pump is 50 cents, and it is useful for spraying poultry houses, &c. The "Fly pest" can be obtained in 5 gallon jacketed cans at a cost of 3½ dollars, in America.

9. *Stump Rot in Coffee*.—The trees in the following list have been reported as known to produce Stump Rot in Coffee when they die. I shall be glad to hear of any additions to the list.

<i>Acrocarpus fraxinifolius</i> ,	... Howligi; or White Cedar.
<i>Artocarpus integrefolia</i> ,	... Jack.
<i>Cinnamomum incrs</i> ,	... Yellaga.
<i>Cinnamomum Zeylanicum</i> ,	... Wild Cinnamon.
<i>Dalbergia latifolia</i> ,	... Beetee.
<i>Eriobotrya japonica</i> ,	... Loquat.
<i>Ficus glomerata</i> ,	... Atti.
<i>Ficus infectoria</i> ,	... Basuri.
<i>Ficus Tsiela</i> ,	... Bili basuri.
<i>Myristica magnifica</i> ,	... Ramanadike.
<i>Soymida febrifuga</i> ,	... Kal garige.
<i>Terminalia belerica</i>	... Tari.

These trees vary in their effect in different districts, but all should be avoided as much as possible as shade trees where Stump Rot is prevalent. Existing trees when they show signs of dying, or if it is decided to kill them for any reason, should be carefully trenched round after they have been rung. (See Sc. O. papers VI).

RUDOLPH D. ANSTEAD, *Planting Expert.*

A Correction

To NOTE No. 7.

Mr. A. G. Nicholson writes:—

"In the issue of February 5th page 33 3rd para. *annas* should be read for *pies*, i.e., 1st line 4—5 *annas*; last line of para. 4 to 6 *annas*."

DISTRICT PLANTERS' ASSOCIATIONS.**South Travancore Planters' Association.**

Minutes of Annual General Meeting, held at Quilon, on January 29th, 1910.

PRESENT:—Messrs. D. G. Cameron (Chairman), J. S. Valentine, R. Ross, J. Stewart, E. M. Ewart, E. Lord, W. E. Bownass, C. Brauder, H. W. Heberden, J. B. Cook, A. W. Leslie, and L. G. Knight (Honorary Secretary);

AS VISITORS:—Messrs. G. Nicoll Thomson, I. E. Cameron, W. Clare, and Mr. R. D. Anstead (Scientific Officer).

The Chairman, in reviewing the past year, said :—

Gentlemen,—As you have all been supplied with copies of the minutes of last meeting, I conclude they may be taken as read.

Since our last general meeting we have had three special meetings, and points you will no doubt wish some information on are, the subjects you asked me to bring up at the Sri Mulam :

1st—The right of Government to sell, etc.

The Dewan, in reply to my question, said the law was clear, not only in Travancore, but in British India, on this point, and the Resident, who was on this dais at the time, confirmed him ; that all property of any description a man possesses, is liable to be attached for his taxes, if unpaid, but that the desire of Government is to cause as little loss and inconvenience as possible. I pointed out that in one case of abandoned Coffee Estates the fact of Government not only selling the Estate on which tax is due, but another Estate in cultivation for this one lot of taxes, implied that the value of the land was insufficient to cover one year's taxes, therefore is excessive.

The Dewan declined to admit this view and said the instance in which this has been done was probably a case of individual hardship, and that inquiries are being made with a view to remedy.

Panalur Bridge.—This question came up on the last day, and I was unable to wait ; but I interviewed both the Dewan and the Chief Engineer. Both expressed regret at the delay, which apparently was unavoidable, and told me the materials had arrived, and the work of repairs would be pressed on as quickly as possible. Of the questions requiring your early consideration, the most urgent is perhaps the Government circular of 4th November 1909, in which we are asked to show reason, why *taxes* on what are generally known as *coffee lands* should not be revised, in the same way as had been done in the case of other lands. The Revenue settlement has no doubt largely increased the land revenue of the country, but this is due, so far as I can learn, not to any increase in the rate of tax, but to the area in cultivation being found to be largely in excess of what had hitherto been paying.

I called on the Dewan during Sri Mulam week, and discussed the question fully with him, pointing out the reasons, in my opinion, why no increase should follow the recent enhancement from 2 to 12 annas an acre.

The Dewan assured me Government had no desire to press hardly on planters, and would give most sympathetic consideration to any facts placed before them, but he wanted definite replies from each Association, giving very fully in detail their reasons why no revision should take place in the case

of coffee and tea lands. He further told me that unless the revision takes place this year, it cannot do so for another 30 years.

Other reasons will no doubt occur to you, gentlemen, and you will bring them before the meeting.

Planters' Benevolent Fund.—The response to the secretary's circular has not been very encouraging, and it is hoped further consideration will lead to the scheme being more generally supported.

L. A. N. Institute.—The Association subscribed to this, but I am glad to say there has been no occasion to make use of its advantages.

European Ward at Quilon.—I understand this is under consideration by Government.

Labour Recruiting Scheme is too involved for me to make any remarks on.

Scientific Officer.—We are pleased to see with us to-day, I am sure you will join with me in giving him a cordial welcome.

The Secretary will now read his accounts, and you will then proceed to the election of a new Chairman. Thanking you for the support you have given me during my year of office, I now resign.

The Chairman also spoke more fully on the proposed reassessment of land, but as his reasons against any enhancement of the taxes are largely embodied in the resolution passed on that subject, they are not included here.

Mr. J. S. Valentine was elected Chairman *pro-tem*. The accounts for the year 1909 were then presented and passed, and the Honorary Secretary resigned.

Election of Office bearers.—On the proposal of Mr. J. S. Valentine, seconded by Mr. J. Stewart, Mr. D. G. Cameron was re-elected as Chairman and Mr. L. G. Knight as Honorary Secretary.

Messrs E. Lord, R. Ross, and J. Stewart were elected as members of the Committee.

On the proposal of Mr. J. Stewart, seconded by Mr. J. S. Valentine, it was resolved to increase the allowance to the Honorary Secretary to Rs.50 per mensem.

Attention was called to the largely increased expenditure of the Association, and to meet this it was Resolved that the subscription to this Association be increased to 3 annas per cultivated acre for 1910.

The Reassessment of lands in Travancore.—After a long discussion in Committee on the subject, in which both Messrs. Valentine and Brander gave sound reasons against the further enhancement of tax, a committee, of Messrs J. S. Valentine, J. Stewart, E. M. Ewart, together with the Chairman and Honorary Secretary, was appointed to draw up a resolution to be forwarded to the Chief Secretary to Government.

The following is the resolution drawn up :—Resolved that this Association views with alarm the proposal of Government to revise the tax on land bought under the Old Coffee rules, as set forth in the Chief Secretary's letter of November 1909 : for the following reasons :—

1. The high rates paid for the land, in some cases as much as 50—70 rupees per acre, and the fact that similar land in Ceylon becomes freehold, and pays no taxes, although land can be bought there as low as Rs.20, as results of recent sales show :—Rs.60 being the highest we have any recent

record of. The tax we pay now handicaps Travancore in its competition with Ceylon, and if the present rate of 12 annas is increased, the handicap will be all the more serious.

2. That of the land originally granted for coffee, only a very small proportion, certainly not more than 5%, has been, or is likely to be, planted in rubber.

3. Even if the bulk of this land were adapted to rubber cultivation, which it is not, there are many reasons why it should not bear the same tax as the land recently taken up for this cultivation.

- a. Most of the land taken up for rubber is on low country tenure, and in only a few instances has Government received anything as value for the land.
- b. Where they have received value, it has been only at a comparatively low rate.
- c. When leaf disease destroyed the coffee, the loss to the planters cannot be short of 50 lacs of rupees. Government came to the aid of the planters, and reduced the tax from 12 annas to 2 annas. Those who had money left, started the cultivation of other products such as Cinchona, and tea, and in some cases have been successful; but many were so hardly hit that they could not replant; all they could do was to pay the tax, and many have been doing this for the last 25 years, without any return, in the hope that some day they would find money to replant, or a purchaser for their land.

The raising the land tax from 2 annas to 12 annas on uncultivated, as well as on cultivated land, has hit these holders of coffee lands hardly, so hardly as to compel most of them to give up all hope of replanting, the land reverting to Government.

4. In the Wynaad District, which suffered much the same as Travancore from leaf disease, this Association is informed that the tax on uncultivated land is 6 pies per acre, and it would have paid the Government to continue the 2 annas tax for this class of land in Travancore.

5. The next aspect that strikes the Association is the uncertainty that attaches to property that is liable to increase of taxation from time to time, and the fact that this would militate against the further investment of outside capital in the country. The present boom in rubber is no indication, or proof, that the permanent value of land as a tea investment will in any way be increased; and the rubber land is in no way prejudiced, because of lesser tax under the coffee land tenure, there being as already pointed out very little rubber planted on these lands.

6. The Association concludes that the idea of enhancing the tax on the coffee lands is suggested by the present possibly temporary boom in rubber, but the two industries as an investment have no bearing on one another, and the tax on tea should not be enhanced owing to the present inflated position of rubber.

Labour.—In answer to the various questions asked by the Anamallai Planters' Association, it was :—

Resolved that this Association is not satisfied with the existing condition of labour recruiting, but has nothing to suggest.

The possible appointment of a planting member to the Legislative Council of Travancore.

Resolved that the discussion of this be left over.

Elephant pits.—Mr. Lord said that the Conservator of Forests had written to him, with a view to helping planters on certain estates to dig pits. Mr. Lord had replied stating how many pits would be required on each estate, but had received no communication on the subject.

Resolved that the matter be left over for Mr. Parker, who had all the papers, to come to the best arrangement he could with the Conservator.

ADDRESS BY THE SCIENTIFIC OFFICER.

Mr. Anstead, the Scientific Officer, whose visit to the district happily hit off the meeting, kindly addressed the meeting, and the following is a brief resumé of his remarks.

Mr. Anstead first explained that, being at present single handed, and his district spread over the whole of S. India, he was quite unable to visit every estate or even outlying districts, and his present tour was made with a view to meeting as many planters as possible, and getting a general insight into the pests and diseases from which each district suffered, and as one disease was the same on one estate as on another, he hoped those planters whom he could not visit would not feel hurt.

As regards tea Mr. Anstead explained this was an entirely new Crop to him, and only the theoretical side of the question was known to him; for instance, planters present would know as much about *Helopeltis* as he could tell them at present, but he wished to impress on the meeting that high cultivation was of the utmost importance in combating diseases; without cultivation, such cures as spraying, etc., were not of much use, the main thing being to encourage the plant into a state of strong and vigorous growth.

Pink disease, which appeared to be the worst enemy of rubber, was best met by the method adopted in other parts of the world, i.e., Cutting down, or when only slightly affected by cutting out the affected part. Pink disease probably reached the rubber from jungle trees, the spores being blown into the rubber clearing, and lodging on the bark of the trees, generally in the fork of the branches, whence it worked its way into the tree—how, it was not quite known; it was probable that the disease was only to be found on certain Jungle trees, perhaps only on 1 or 2 varieties, and planters were asked to help him in trying to ascertain which these trees were, as by cutting these out, near the boundaries of the estates, the evil should be greatly mitigated; the spores were blown into the clearing in the dry weather but only started to develop in the wet weather.

As a preventative, he suggested spraying with Bordeaux mixture in the dry weather; it was a question for planters to decide whether the cost of spraying would not more than recoup them for the loss of trees, or loss of time caused by the disease; it was a business proposition. The only cure known was cutting and burning the diseased part.

He noticed planters used coal tar for covering wounds in the bark; coal tar was liable to burn the bark, and retard the growth of new bark. As a substitute he recommended Resin Oil, which though not obtainable at present in India, he hoped would soon be so, as he was trying to make arrangements with firms to import it.

Mr. Anstead declared himself strongly opposed to any system of clean weeding, and advocated the intelligent use of weeds in all cultivation. By that he meant the growing of a definite crop of one kind of weed, leguminous for preference, which could be controlled, and cut down, and used as a mulch in the dry weather to cover up the soil, which should not be exposed to sun and wind, as he saw it in many places. A weed was wanted which made a good cover, thus killing other weeds and grass; grew only about 2 feet or so

high, and contracted no diseases to which the staple crop was liable. Such a weed would probably be found in the local flora, and it was only a matter of searching for it. *Cassia mimosoides*, a common plant in other districts, was one of the most suitable weeds he had seen yet; Mr. Anstead asked that the opponents of the use of weeds should give this system a trial, on an experimental scale, and compare the results obtained by it with those obtained under the clean weeding system.

In reply to questions, he said mulching with a leguminous crop was, to all intents and purposes, as good as forking them in, very little if anything was lost, and great expense was saved.

The *Planters' Chronicle* was in future to be published weekly, to a great extent to enable him to answer questions from planters, as regards diseases, and other matters.

In cases when Pink disease had only spread half way round a tree he advised cutting out, in preference to cutting down, but the wound must be washed, and also carefully watched; if the disease reappeared more cutting must be resorted to.

Mr. Anstead was cordially thanked by the meeting for his most interesting lecture.

L.A.N.I.—A telegram was received from the British Resident reading:—

Lady Amptill Nursing Institute propose locate nurse in Travancore permanently for benefit subscribers and others, does your association approve?

To which a reply was sent:—

Association approve locating nurse Travancore suggest Quilon as headquarters.

This being all the business, a vote of thanks to the Chairman terminated the meeting.

(Sd.) L. G. KNIGHT,

Honorary Secretary.

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The Dutch Duty on Tea.

It is stated in a Colombo paper that Dutch tea traders are having some trouble in the matter of the duty on tea. Some time ago a proposal was laid before the Dutch parliament by the Minister of Finance, intending, provisionally, to raise the import duties by an amount equal to 30 per cent. of the present duties. This proposal aroused much discussion, as it was considered a very bad way of financing the Government. Some members of the tea trade have pointed out, says the correspondent of a financial contemporary, "that the duty on tea is still based on a decree adopted in 1822, when the average value of the article amounted to 1'25 fl. per Dutch pound and when a duty was imposed equal to 5 per cent. of this value. At present the average value is only 0'40 lb. being less than one-third of the price three-quarters of a century ago; so that the duty, which has remained unchanged in the meantime, now amounts to more than 30 per cent. of the real value. It stands to reason that it will be most inconvenient if the nominal duty is raised from 5 to 6½ per cent., which would practically mean raising the duties from 30 per cent. to 40 per cent. of the value. This would be all the more regrettable as an important market for Java tea has gradually developed here, which market might be killed by further burdens, to the benefit of the London market, which is its strongest competitor.

INDIAN TEA ASSOCIATION, CALCUTTA.

Extract from Proceedings of a Meeting of the General Committee held on January 25th, 1910.

Correspondence with the Indian Tea Association (London).—Letters of 31st December 11th January from the Secretary, Indian Tea Association (London), were ordered to be recorded. The principal subjects dealt with in them were as follows :—

Tea Duty.—Mention was made of the following resolution adopted by the Committee of the Tea Buyers' Association in London :—

“ That the Committee of the Tea Buyers' Association hereby
 “ expresses their thanks for and appreciation of the action taken
 “ by the Indian Tea Association (London), the Ceylon Association in London, the Tea Brokers' Association of London,
 “ Tea Importers, Planters, and Brokers generally in supporting
 “ the action of the Tea Buyers' Association in connection with
 “ the Tea Duty question by altering the conditions of sale by
 “ the addition of clause 7a.

Communications in the Tea Districts.—In the proceedings of the meeting of the General Committee held on the 30th November last, reference was made to a set of maps of the tea districts which is under preparation. In connection with this matter a letter of 12th January had been received from the Government of Eastern Bengal and Assam suggesting that it would be useful if particulars could be included and made clear as to the existing means of communication by road, rail and river, and also proposed and desirable improvements in them. In regard to roads it was added that a programme was in course of preparation and that it would be useful, in dealing with it eventually as funds become available, to know the requirements of the tea districts. The suggestion as to the inclusion in the maps of particulars as to existing communications was to be forwarded to Mr. Taylor, Calcutta, by whom maps are being prepared. And with regard to the requirements of the tea districts it was agreed to consult the Branches.

Tea Dust.—Reference was made, in the proceedings of 2nd November last, to a letter which the General Committee had received from the Collector of Customs, Calcutta, with regard to the quality of a consignment of tea dust. As then arranged a copy of the letter had been sent to the Calcutta Tea Traders' Association for their information, and an enquiry had been made by the latter as to what proportion of sand renders tea dust unfit for human consumption according to the standards of the Home Customs authorities and the Calcutta authorities, respectively. This enquiry was passed on to the Board of Revenue and their reply, dated 13th January, was now before the Committee. It was stated that in England the Inspectors appointed under the Sale of Food and Drugs Act of 1875 decided on their own responsibility in regard to tea which is clearly deleterious, and that doubtful cases are sent to the analyst at the Government laboratory, who decides each case on its own merits ; from the report of the Commissioners of Customs it appeared that in 1907 a sample of tea dust was condemned which was found to contain 2 per cent. of iron sand and 4 per cent. of other mineral matter. In Calcutta no standard had been fixed and the Health Officer stated that the English precedent would be followed. Copies of the Board's reply had been sent to the Tea Traders' Association and to the Calcutta Tea Brokers' Association for their information.

RUBBER.**Weeds on Rubber Estates.**

In the *Times of Ceylon* of the 3rd instant "Nambudri" writes from Cochin State:—

"A great deal has been said and written on the subject of weeds on a rubber plantation, but much misapprehension appears to exist regarding the parts that weeds play in the economy of nature. Many planters rail against them as the 'bane of rubber estates,' and think that the highest praise that can be given to a planter is that his estate is 'clean.' When, however, the matter is fairly considered, it would seem that weeds are by no means the unmixed evil that they are represented. The notion that perfectly clean land is best for rubber would appear to have been derived by those who have imperfectly studied the subject from the practice of agriculturists, who always endeavour, and with reason, to keep their land free from any growth except that of the particular crops they are raising. Agriculture and arboriculture are, however, two very different things. The farmer about to lay down a field of wheat, for instance, knows very well that, if he has weeds amongst it, part of the nourishment which should go into his wheat will in fact go into weeds, and that by that amount he is a loser. His wheat and his weeds grow and are cut together; but not in rubber cultivation as in agriculture are they gathered together. The latex is harvested while the tree remains with the weeds either buried or forked round the tree, forming the best of all manure, pure leaf mould. What then is taken from the soil? Simply the latex from the rubber tree. All that the weeds took from the soil is returned to the soil, plus a large amount of carbon and nitrogen absorbed from the atmosphere. If the lives of the rubber tree and of the weeds were coterminate, as in the case of wheat, all that the weeds took from the soil would be sheer robbery from the rubber. But it is not so; the life of a generation of weeds is but a span compared with the life of a rubber tree, and as each generation of weeds is cut down and buried all that it took from the soil is returned with interest. What is jungle soil but rotted weeds! The rich soil of the Nilgiris sholas did not fall from Heaven above, or spring from the rocks beneath, but is simply the accumulation of generations and generations of dead weeds. First a seed found a resting place in a moist corner of the rock, or gravelly soil; it germinated, spread its leaves and died, forming the first morsel of vegetable mould. The next seed wafted thither fared better than the first, in that it had the mould evolved by the decomposition of its predecessor in which to grow; and so on by degrees, until the mould formed by generations of plants gradually became strong and rich enough to support gigantic trees. All this has resulted from the natural growth and burial of weeds. So far from any exhaustion resulting from this vegetable growth, the very opposite has been the case. The vegetable themselves have formed the soil in which they grow, and so it must always be where there is any vegetable growth, and such growth dies and decomposes on the spot on which it grew.

"If on a rubber estate the weeds were carried off, or otherwise made away with, impoverishment of the soil would follow, but so long as they are annually buried the only result that can follow is an increase in both bulk and richness of the soil. All that the weeds really deprive the rubber of is the benefit of the constituents of the soil which go to form a single generation of weeds. This is a trifle, and if the soil is so poor that it cannot grow rubber and also during the few months of rainy weather support a single generation of weeds in addition, it must be 'poor indeed,' in fact too poor to be planted—by a wise man—with rubber. That an estate could profitably be worked which was covered with weeds all the year round is, of

course, impossible, but so long as weeds are only allowed to grow during the heavy rains of the monsoon, and are then dug into the soil, they do no harm, but a great deal of good by keeping the soil from being washed away. Weeds undoubtedly do a great deal of harm in the dry weather, as the moisture then in the soil is limited and it is insufficient for weeds and rubber, but in the monsoon the moisture is far in excess of what is required. In young rubber also the soil should be kept perfectly clean, so as to allow the young and delicate roots to spread and strengthen without interference, and also in order that the young plant may be exposed in all its parts to the action of the sun and air, and that the whole moisture in the ground may be available for its growth alone. The young rubber plant needs in fact the care which any young thing needs, and which is entirely different in its nature from the treatment required in its maturity.

"The Advantages of Weeds.—These consist in their preventing loss of soil by wash during their lives, and by continually enriching the soil in their deaths. To set against these is the single disadvantage that during their brief lives a certain small proportion of the constituents of the soil are locked up in them for short intervals."

A couple of days later the same Ceylon paper published a letter from "Lankapura," a Ceylon man, who writes:—

"Nambudri's' interesting letter in yours of 3rd instant re-opens a question on which there is much to be said on both sides. It seems to me that in this discussion the slope of land has not been sufficiently taken into consideration.

"On flat and gently sloping lands, carefully drained and not subject, therefore, to denudation from wash, there is no doubt that clean weeding from the start has been cheapest in the end and that the growth of the trees in it is greater than in land allowed to grow weeds. Better still are the growth results where the rubber has been interplanted with dadap and albizzia to shade the soil and grow mulch for putting round the rubber trees and still clean weeded.

"On steep land, which, by the way, is often very suitable for rubber, the case is different, and there is no doubt that denudation of the soil, both by direct rainfall and drip, as well as by 'drywash,' is completely prevented by a carpet of suitable and manageable legumes.

"The most obvious objection to the unmanaged carpet of weeds is the danger from fire. We, in Ceylon, have but a faint idea of what weeds can grow to in the richer S. Indian soils, and I have there seen 40 acres of four-years-old coffee wiped out by a four months growth of weeds—since last hoeing—catching fire six weeks after the hot weather had set in!

"Another objection to the carpet of weeds is in connection with the artificial manuring of rubber from an early stage. This is rapidly becoming a *sine qua non* of rubber cultivation and increases the yield and profits enormously. In clean land the rubber responds to it immediately, as it gets most of it as food. In weedy land the weeds get most of it and simply grow lusher and have to be cut down and buried time after time at enormous expense before the rubber can get the full benefit; and what the damage is to the surface feeding roots of the rubber can only be imagined.

"Even on steep land a correct system of drainage which keeps back the washed-down soil, and a system of deep tillage from our early period as soon as the decayed jungle roots permit of forking will go far to prevent denudations of the soil. In easy land and even up to 12 or 15 per cent. slope they stop it altogether.

"Latex is a *hydro-carbon*, and taken by the tree from the atmosphere and not from the soil as 'Nambudri' suggests."

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The Scientific Officer.

Mr. Anstead returned to Bangalore on Monday, his tour in Central Travancore and the High Range having been unavoidably postponed.

It is probable that he will leave in a few days for a very short trip in South Mysore, with the special purpose of organising arrangements for the continuance of coffee hybridisation experiments, which he considers have been too much neglected during recent years, and ought to be resumed and conducted systematically.

After his return from Mysore Mr. Anstead expects to be able to make another tour in Travancore, embracing the Mundakayam, Central Travancore and Kanan Devan areas.

International Rubber Exhibition, 1911.

Mr. A. Staines Manders, the Organising Manager of the above Exhibition, writes :—

"The next International Rubber and Allied Trades Exhibition will be held in London opening in June 1911. Sir Henry A. Blake, G.C.M.G., will again be the President. The Exhibition will have the support of a very large and influential advisory Committee, residing in all Rubber-growing countries, and also in Europe, America and the British Isles. By this early intimation as to the date it will enable the various countries to make complete arrangements, so that the Exhibit will be really a credit to the country from which it emanates.

"It is again proposed to hold a conference, and in this case the committee have been promised the support of manufacturers in France, Germany, America and Great Britain. By commencing making arrangements now I am enabled to make them more complete than was the case in the last Exhibition.

"I have made a suggestion to several countries, which I believe in many cases has been adopted, *viz.*, to have a preliminary exhibition of the exhibits before sending them to London, and to have a competition and awards. Then the exhibits can be shown against the exhibits of other countries when they arrive in London, and it will be interesting to compare the first prize products of one country against the other. Most of the gentlemen resident in London who so kindly supported the last Exhibition have already intimated their willingness to do so in this instance.

"The Exhibition will open at noon, Thursday 9th June and close Saturday 25th—15 days. Further particulars to be had of A. Staines Manders, Organising Manager, 75, Chancery Lane, London, W. C.

Scientific Officer's Papers.

XVII.—PHOSPHATIC FERTILISERS.

One of the essential plant foods, without which no plant can grow, is phosphoric acid. In the plant phosphorus forms an important constituent of chlorophyll, which controls the formation of sugar and starch, and it also plays an important part in the formation of albumens.

Various phosphatic fertilisers can be used to supply this plant food and restore to the soil the phosphoric acid removed by the crop, such as superphosphates, basic slag and bones. The best form of fertiliser to use depends largely upon the nature of the soil. The phosphoric acid can only be obtained by the plant in the form of a solution, so that a fertiliser is needed which is soluble, or which will become soluble, in the soil water.

Phosphates are found in nature chiefly in an insoluble form, such as the mineral apatite, consisting of an insoluble lime salt known as tricalcium phosphate. When this is treated with a strong mineral acid, like sulphuric acid, another lime salt, called monocalcium phosphate, is formed. This is soluble, and is known by the trade name of *superphosphate*, or, since it is often made from bones, "dissolved bones." Could sulphuric acid be cheaply obtained in India this valuable fertiliser could be manufactured locally from the bones which are easily obtained in large quantities.

Superphosphate should contain about 20 to 25% of water soluble phosphate. It is a fertiliser which is especially suitable for soil which contains plenty of lime (at least 5%), and so is not the best form of phosphatic fertiliser to use on the majority of South Indian coffee estates. When applied to soils which are deficient in lime, and which contain iron and aluminium, it forms insoluble combinations with these, and so becomes unavailable to the plant. Phosphoric acid which has been rendered insoluble is often referred to as "reverted phosphate." An application of superphosphate should be preceded by a heavy dose of lime.

Dissolved bones supply in addition a certain amount of nitrogen, and the dissolving process is not usually carried far enough to make the bones completely soluble, so that this particular form of superphosphate is more suitable for soils slightly deficient in lime, than that made from rock phosphate.

Another form of phosphatic fertiliser very largely used is Basic or Thomas' Slag, a by-product from the manufacture of steel from pig iron. This consists largely of a lime phosphate called tetra-calcium phosphate. Though insoluble in water, it is soluble in weak acids such as those excreted by plant roots, and found in soil water. A good basic slag should contain about 13% of phosphoric acid soluble in citric acid. Its solubility, and hence its availability to the plant, largely depends upon its fineness, and it should be ground so fine that 80% at least will pass through a sieve having 10,000 holes to the square inch. Basic slag is suitable for heavy damp clay soils, deficient in lime, but containing plenty of acid vegetable matter. It must never be mixed with sulphate of ammonia or any nitrogenous manure, or the excess of lime which it contains will set ammonia free from the latter, and the nitrogen will be lost. The right application is usually considered to be 4 to 5 cwt. per acre, and it should be mixed with sand, or dry earth, and evenly broadcasted so as to mix it as intimately as possible with the soil.

Intermediate between superphosphate and basic slag is a fertiliser known as basic superphosphate, a dicalcium phosphate. It consists of superphosphate which has been made alkaline with lime and it should contain about 35% of lime and 12% of phosphoric acid soluble in citric acid. It is suited

to light clay, gravel, granite, or sandy soils deficient in lime, and will possibly give good results on many of the coffee soils of Southern India. The usual rate of application is 4 to 5 cwt. per acre. In a soil containing a large amount of lime it rapidly reverts to the insoluble tricalcium phosphate.

It will be noticed that the presence or absence of lime in the soil is a most important consideration where phosphatic fertilisers are concerned. The following extract from the *Agricultural News*, VIII 194, emphasises this point :—

“Experiments that have been conducted for several years in Russia appear to demonstrate that, in soils containing a small amount of lime, the absorption of phosphoric acid by the plant takes place to such an extent as to interfere with its growth, because of the presence of an excessive amount of the acid. As the amount of calcium carbonate is increased in the soil by applications of lime, the absorption of phosphoric acid decreases, and eventually the stage is reached at which this takes place to so small an extent as to cause the plants growing in such a soil to exhibit all the symptoms of a lack of phosphorus, even in the presence of a good supply of that element.”

An application of lime should be regularly given to soil which has been receiving phosphatic manures. The lime sets free the phosphoric acid which has reverted and become insoluble by forming compounds with iron and aluminium.

Several other fertilisers contain, among other plant foods, enough phosphoric acid to make them valuable as phosphatic fertilisers. Among these may be mentioned bone meal, which should contain about 15 to 20% of phosphoric acid with usually up to 5% of nitrogen. The phosphoric acid is insoluble but becomes gradually available in the soil, so that the effect of an application of bone meal lasts over several years.

In buying a phosphatic fertiliser the only question as a rule that need be considered is how much available phosphoric acid it contains. Insoluble phosphoric acid only becomes slowly available, and it is usually considered to be half the value of the soluble phosphoric acid in the analyses. What is really needed is “water soluble” or “citric acid soluble” phosphoric acid, and it should be borne in mind that if a soluble phosphate is added to a soil rich in lime, or iron, much of it will often revert in a short time, and nothing will be gained.

To sum up, apply a basic superphosphate to a light soil deficient in lime, a basic slag to a heavy clay soil rich in vegetable matter but deficient in lime, and superphosphate only to soil containing plenty of lime.

The following analyses of phosphatic fertilisers are given for reference. They have been extracted from analyses made and published from time to time by Dr. Lehmann :—

		PHOSPHORIC ACID			NITROGEN.
		Total.	Water soluble.	Citrate soluble.	
Superphosphate	...	21'45	17'60	3'69	
Basic superphosphate	...	13'89	—	11'9	
Basic slag	...	14'40	—	13'41	
High grade basic slag	...	17'29	—	13'52	
Bone meal	...	23'97	—	6'94	3'73
Bone meal (average)	...	22'45	—	—	3'61

RUDOLPH D. ANSTEAD, *Planting Expert.*

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Mr. W. McRae, M.A., B.Sc. (Edin.), has been appointed Mycologist in the Department of Agriculture, Madras, with effect from the 5th January 1910. His head-quarters will be at Coimbatore.

Notes and Comments by the Scientific Officer.

10. *Stump Rot in Tea*.—In South Travancore it is found by experience that if a Silver Oak tree (*Grevillea robusta*) dies, or is killed, in Tea, Stump Rot almost invariably sets in and the Tea round the dead *Grevillea* stump dies from the attack of the *Rossellinia* fungus.

This being the case, it will be well if planters in the Wynaad who have *Grevilleas* growing among their Tea, and who on the occasion of my visit were talking of cutting a good deal of it out, would consider well before doing so what steps they propose to adopt against possible loss from Stump Rot. It will probably be profitable in the long run to remove the *Grevillea* Stumps altogether. This can be easily and cheaply done with the use of a Stump Jack. In any case some steps should be taken to guard against the attack of *Rossellinia*, which exists in the district, and if the stumps are not removed altogether they should be trenched round so as to isolate them as soon as the trees are felled or rung (See Sc. O. Paper VI).

11. *Trenches and Renovation Pits*.—In some coffee districts the practice of digging trenches between every few rows of bushes prevails, and an opinion is often asked for as to the benefit of this practice. It is difficult to understand why such a system should produce any good results, but that it has done so on a few isolated estates is, I believe, an undoubted fact.

It is possible that in these cases the soil removed from the trenches, and spread, has acted beneficially by forming a mulch, but a mulch of leaves would serve the purpose better, and be cheaper.

Where surface wash exists of course, a system of trenches will remedy this defect, and by doing so benefit the Coffee, but again surface wash can be prevented by better and cheaper means.

The great objection to the system is that in digging the trenches so many coffee roots are cut and killed, and the soil area from which the roots can draw food is restricted. If trenches are necessary they should be dug when the clearing is originally made, and before the coffee is planted, and kept open.

Much the same applies to 'renovation pits.' It is again difficult to see what good these can do, except that they prevent wash, and catch the surface soil in time of heavy rains.

In places where these practices do good it is probable that a still better result would be obtained from a system of drains, following the contour of the land. Such drains, again, should be dug in the original clearings so as not to cut coffee roots in the making of them.

RUDOLPH D. ANSTEAD, *Planting Expert*.

—:o:—

New inducements are being offered in Brazil, by the Government and one of the Municipalities of S. Paulo, to planters of *Hevea brasiliensis*. The *India-Rubber Journal*, commenting, observes:—

"We believe that every effort will be made to preserve the wild rubber industry and that before long we shall hear not only of free concessions, but of abolition of taxes and the granting of subsidies. We are not going to lose the Amazon crop through an excess of plantation rubber knocking down the price; we shall always get some raw rubber from America and Africa though prices fall to less than 2s. per lb. for the best."

THE PLANTERS' ASSOCIATION OF CEYLON.

The Annual Meeting of the Ceylon Planters' Association was held at Kandy on February 11th, 1910. Mr. Edward Rosling presided.

CHAIRMAN'S REVIEW OF THE YEAR.

The Chairman :—Gentlemen, following the procedure which has obtained in previous years, with your permission I propose to take the report as read. It is customary at the end of the Association's year, and before moving the adoption of the report, for the Chairman to refer briefly to a few of the topics which have interested the Association during the period under review. In the first instance you are to be congratulated on the position of almost all your staple products. Tea has again broken the record, the total shipments amounting to 191½ million pounds. Of this 185½ million pounds were black tea, which is the largest amount ever shipped in one year; and there were six million pounds of green tea, the second largest amount shipped since the inception of the industry. In spite of these heavy shipments we are to be distinctly congratulated on the maintenance of prices throughout the year. In cocoa we have again the second biggest shipment yet recorded, namely, 80,000 cwt., but here prices have not been satisfactory. As regards that infant product rubber, shipments reached 1½ million pounds, and as you are all aware, prices were all that could be desired. What the future of rubber may be still rests on the knees of the gods, but it is satisfactory to know that contracts have been entered into for 1911 based on the London price of 7s. 6d. a lb. (Cheers.) Coconuts, although the crops as a whole ran rather short, showed fair return as regards prices. As regards cardamoms, which is after all almost a minor industry, it is worthy of notice that America which a few years ago took no cardamoms, since the inception of the cardamom cess is now the fourth largest importer of that product. On the whole, with prices and crops satisfactory, it is satisfactory to realise that our system of cultivation still continues to improve, while there has been an

ALMOST COMPLETE IMMUNITY FROM PESTS

and diseases. It is true we have *tortrix* in certain districts in tea and shot-hole borer, bleeding disease in coconuts, and canker in cocoa, but in regard to the last three where careful cultivation is steadily persisted in they would appear to cause very little reason for anxiety. . . .

Later, the report was adopted.

Extracts from the Fifty-Sixth Annual Report for the year ending 31st December 1909.

In presenting the Fifty-Sixth Annual Report your Committee congratulate the Association on the continued increase in the Register of Members, which number 1,200, being 71 more than in the preceding year.

Finances.—A reference to the Balance-sheet will show that the present financial position is satisfactory, but as the "Thirty Committee" Cess funds can no longer be charged with their present proportion of office expenses, and as the annual contribution to the Ceylon Association in London has been raised to £100, a reconsideration of Ways and Means is necessary, and your Committee recommend the appointment of a small sub-Committee for this purpose.

DISTRICT ASSOCIATIONS.

The number of affiliated District Planters' Associations was raised to 28 at the beginning of the year by the inclusion of the re-constituted Balangoda Planters' Association as a separate entity.

Your Committee have again to record their cordial appreciation of the willing co-operation of the Honorary Secretaries and Office-bearers of the District Planters' Associations in so materially assisting in carrying on the work of the year.

CEYLON ASSOCIATION IN LONDON.

Cordial relations have been maintained with this body, and on the 21st Anniversary of its institution, a resolution was passed conveying the thanks of this Association to Mr. Martin Leake for his long services.

This Association having been approached with a view to assist in putting the financial affairs of the London Association on a sound footing, your Committee agreed to raise their annual contribution from £60 to £100.

UNITED PLANTERS' ASSOCIATION OF SOUTHERN INDIA.

Your Committee had much pleasure in receiving and welcoming Mr. Geo. Romilly, who attended their March Meeting as a representative of the United Planters' Association of Southern India.

His visit did much to clear the ground for mutual understanding and co-operation on matters of interest common to the planting communities of Southern India and Ceylon, and your Committee regret that it was found impossible to return the visit by sending a representative to the Annual General Meeting of the U.P.A.S.I., at Bangalore.

They however expressed the hope that the failure to do so would only cause temporary interruption to the interchange of such visits.

PLANTING PRODUCTS.

Tea.

At medium and high elevations the season has on the whole been a favourable one and crops have been well ahead of 1908.

Uva benefited much by seasonable rains in the last five months of the year, after rather a long drought previously, but in some of the districts north of Kandy the rainfall was in excess of requirements.

In the older low-country districts, especially the Kelani Valley, Tea crops have fallen short of estimates owing to excessive rainfall, and in some places to attacks of *Helopeltis* and Shothole borer.

Prices all round have been satisfactory and above the average, enabling manuring and cultivation to be well maintained.

This again has reacted on the total production, which is about 12,000,000 lbs. ahead of the previous year, as the maintenance of the bushes in a vigorous and healthy condition enables them better to withstand the effects of unfavourable climatic conditions and the attacks of insect pests and blights.

Tea fields interplanted with Rubber, where the latter trees are 5 years old and over, are gradually falling off in yield, and the decrease will become more apparent within the next two years.

A considerable extent, estimated at 3,000 acres, of land has been opened and planted with Tea during the season under review, principally in the Sabaragamuwa and Uva Provinces. Further extensions are planned for 1910.

COLOMBO TEA REPORTS FOR 1909.

The feature of this season was the high market prevailing since early July. The average price during this period remaining steady at 40 cents rising to 43 cents, about four or five cents above 1908.

Another feature was the fine flavour sent from the Uva District during July, August, and September, the more remarkable as all estates, low and high, were affected.

Newara Eliya sent some flavoured teas in February, otherwise quality has not exceeded a fair average.

Apart from quality there was a strong demand for thick coloured liquoring teas throughout the year.

Owing probably to heavy stocks held by Russians, Dust and Fannings have not reached the high quotations of 1908, at the same time competition was good and prices above the average were generally realised.

It is noticeable that Russia has taken some 4 million lbs. less this season, a fact largely due to stalky appearance, also to choppy open and ragged leaf teas.

About 4 million lbs. less than last year were offered on the Colombo market, but the actual quantity disposed of reached a similar figure to 1908.

Total offerings were 80,303,558 lbs. against last year 84,555,381 lbs., with actual sales 65,530,994 against 65,563,394 lbs.

The average of local sales for 1909 was 40 cents compared with 38 cents for 1908.

GREEN TEA.

The year opened with a good healthy demand for the American markets, stimulated by a favourable market in Colombo, and, although prices for the first two months, from the producer's point of view, may not have been over-encouraging, the increased business resulting therefrom soon rectified the position. The market in March began an advance which gradually increased as the season progressed; and the year closed with the average price of low-country green tea on a higher basis than has hitherto been known in the history of the trade. As an illustration of the phenomenal advance which has taken place during the season in low-country greens, it is only necessary to state that, whereas the average price of invoices at the commencement of the season was 34 cents, the same gardens have to record averages of up to 45 cents for the closing months of the year, or an advance of 11 cents during the year. Notwithstanding the fact that the market during the second half of the year has been a good and steadily-advancing one, there has been no marked increase in the manufacture; this is, no doubt, partly attributable to an idea which exists regarding the uncertainty of the green-tea market, and also to the fact that the bulk of the green-tea manufactured is sold by private sale, and prices are, in consequence, not given the same amount of publicity as in the case when teas go forward to auction. The total manufacture for the year is just on about a par with last year—6,000,000 lbs. approximately representing the total crop. Less green tea has been made in Up-country districts this season, but the deficit from that quarter has been about balanced by a slight increase from the Low-country. The quality of the crop has been good, and the high standard of manufacture maintained not only reflects great credit on the producers, but has gone far to establish a permanent demand for Ceylon greens in foreign markets. Shipments for the season should total approximately 6,000,000 lbs. out of which America will take fully 4 millions, the balance being absorbed by the United Kingdom and Russia. An analysis of the Chamber of Commerce figures reveals one very satisfactory fact, *i.e.*, that last year's increase in shipments to American markets has not only been maintained, but still further improved upon during the period under review. Shipments to Central Asia have been curtailed, owing to accumulated stocks and also the keen competitions of China growths. As this market only takes

the finest qualities of green tea, the decreased demand has curtailed Up-country production, which explains the reason why less high grown green tea has been made. The bulk of the shipments made to Russian markets having gone forward during the second half of the year, however, seems to indicate that the adverse conditions affecting that market earlier in the season have now disappeared, and prospects look brighter for 1910. The competition of Japan and China tea has been keenly felt in the American markets during the season, and the high prices now ruling for Ceylon greens are re-opening the door for growths of the former countries to regain ground which was lost when Ceylon teas were selling on a more normal basis. The recent phenomenal advance in prices is primarily due to increased demand and insufficient supplies; and the fact that Low-country green tea crops for 1910 are being bought up at record prices seems to augur well for the prosperity of this branch of the tea industry.

The estimated Tea crop for 1910 is 193,000,000 lbs., distributed as follows:—

			lbs.
United Kingdom	...	...	118,000,000
Russia	...	...	19,000,000
Other Countries in Europe	...	...	2,500,000
America	...	...	17,500,000
Africa and Mauritius	...	...	1,500,000
Australia	...	...	25,000,000
India	...	...	1,500,000
China and Singapore	...	...	8,000,000
			<hr/> 193,000,000 <hr/>

Rubber.

An unusually wet season appears to have been generally favourable to the growth of Rubber, though the excessive rainfall has interfered somewhat with collection of latex.

Estimated yields have, however, been mostly secured or exceeded.

The new system of tapping, from which so much was hoped, has not up to date been a success in practice, and in wet districts the best results are obtained by using the knife only, with no water or pricker.

Fungoid diseases and blights claim attention, but are not prevalent to any serious extent.

Their presence, however, indicates the necessity for special steps being taken to prevent their spread, and your Committee would urge upon Rubber planters the great importance of obtaining the best scientific advice in dealing with such diseases, as also regarding the chemistry and factory treatment of the latex.

During the year prices for Rubber reached unprecedented figures, influenced by a very strong demand and a short supply.

The record prices paid for Ceylon plantation Rubber were 9s. 3½d. per lb. in London and Rs. 7'20 in Colombo.

The year closed with a quotation of 7s. 7½d. for fine hard Pará,

The shipments of Ceylon Rubber for the year amounted to 1,492,580 lbs. and the crop for 1910 is estimated at 3,000,000 lbs.

Cacao.

The rainfall during 1909, although not above the average, was very well distributed, too much so far the wetter cacao districts, as cacao like all fruit trees requires an occasional spell of fine weather, the crops from districts

which got a full South-West Monsoon were disappointing and attacks of *Helopeltis* were occasionally reported. In the drier districts, however, crops were as a rule good, especially on those estates which suffered most severely in the drought of 1908, some of which have given record crops. The effect of the dry season is also seen in a diminution of canker and other kindred pests. Speaking generally, cacao is now everywhere remarkably free from disease of all kinds, a slight additional expense in attention to the trees being all that is necessary to keep them in good order. Now that canker is disappearing it is possible to cultivate cacao highly, and when this has been done, in conjunction with a proper system of pruning, the results are uniformly satisfactory, but it must be remembered that without a properly carried out system of pruning, manuring is useless, the manure all running to wood.

The cacao market seems much disorganised and there is no apparent prospect of a recovery in the near future, in fact at present prices cultivation is a necessity if estates are to be made to pay, with it a good acreage return may still be looked for; one trouble Cacao Planters do escape, and that is that the labour question does not cause them any great anxiety.

The crop for the year was 80,100 cwts., as against 62,186 cwts. last year. The estimate for the current year is 70,000 cwts.

Cardamoms.

The weather during the year has been very suitable for Cardamoms, and the estimate of 750,000 lbs. for 1909 will be realized.

Prices for fully bleached Cardamoms have been better than last year, but for green dried the average for the year has been very low, owing to the demand from India being only half that for 1908.

Foreign countries have taken fully 110,000 lbs. more than last year in direct shipments.

The prospects for 1910 are not so satisfactory, owing to the partial failure of the North-East Monsoon, and 650,000 lbs. is the estimated crop for the year.

A sum of Rs.1,602'80 has been spent in advertising Ceylon Cardamoms in the United States, America, from which country many enquiries have been received for information regarding this spice.

America now stands fourth in the list of countries importing Cardamoms direct from Ceylon, having taken 56,995 lbs. in 1909 as against 9,635 lbs. in 1908.

INSECT PESTS.

No new pests of any importance have occurred upon tea during the past year.

"Shot-Hole Borer" continues to attract attention, and is probably slowly extending its range, but with careful cultivation the effects of its ravages may be mitigated.

The attempt to attack this pest by importing the predatory beetle (*Clerus formicarius*) has been delayed owing to unfavourable seasons in England. It should be understood, however, that the success of this experiment is by no means assured. It can do no possible harm, as it is dependent upon animal food. If it fails to establish itself in our tea bushes, it will merely die out, and disappear.

"Green Bug" (*Lecanium viride*) appears inclined to establish itself upon tea in parts of the Uva Province, and will be the subject of an investigation at an early date.

Hevea brasiliensis continues to defy insect enemies so long as it remains in a healthy condition ; but, when attacked by any fungus pest, the diseased stems quickly become infested by boring beetles of many kinds.

A species of Slug has been observed to attack the young buds of *Hevea* plants, and has occasioned some damage. This same species was convicted—a few years ago—of imbibing latex from recently tapped trees. It will not be difficult to find remedies to keep this pest in check.

The importation of new pests, from other countries, is being guarded against by the fumigation of all imported growing plants and of such fruits as are cultivated in the Island.

BLIGHTS.

The weather conditions during 1909 were on the whole favourable for the development of fungus diseases, but there was not the marked increase which might have been expected.

In Tea, the extension of the area under cultivation was attended by an increase in the number of cases of the root disease which is found in new clearings, viz., that caused by *Poria hypolateritia*, this occurring at much lower elevations than those to which it was formerly supposed to be confined. The only other detail worthy of mention is the fact that the common tea root disease, caused by *Ustilina zonata*, which usually develops from old *Grevillea* stumps, has been found to originate similarly on *Albizia* stumps.

In *Hevea*, as in Tea, there are no serious new diseases to be recorded. The prolonged rains led to the appearance of "canker" on some estates being brought to notice "pink disease" and "die-back," both of which have been known for the last five years. In the majority of cases, the latter diseases were discovered when only one or two trees had been attacked ; and while the present vigilance of estate superintendents continues, there is no reason to apprehend serious loss from either.

Cacao canker was prevalent towards the close of the year. It would appear from the correspondence that the treatment of this has in some cases been neglected, and that the newer generation of superintendents has forgotten the experience of twelve years ago. If a cycle of wet years should occur such a state of affairs might have serious consequences. With this exception, it is gratifying to have to record that especially in *Hevea* cultivation diseases are now detected, and taken in hand by superintendents, in their earliest stages. Consequently our varied cultivations are not subject to fungus diseases to an extent which could give occasion for alarm.

LEGISLATIVE ENACTMENTS.

By far the most important of these concerning the Planting Community is the Amending Labour Ordinance No. 9 of 1909, which came into force on October 1st.

The provisions of this Ordinance were fully discussed at a General Meeting of the Association held on 26th March, when the amendments and alterations recommended by the Sub-Committee were adopted. These recommendations were subsequently considered by a Sub-Committee of the Legislative Council and embodied in the Ordinance as finally passed.

So far as can be judged at present the introduction of the initial provisions of the Ordinance has been accomplished without friction, and despite adverse criticism owing to the varied interpretations of several clauses the general opinion appears to be that the measure provides a satisfactory solution of many difficulties, and is a distinct improvement on the old Ordinance.

Your Committee would point out that the only authoritative decision on the correct reading of doubtful clauses must come from the Supreme Court.

Another Ordinance affecting the Planting Community is that amending the sections of the Penal Code under which the names of those liable to serve as jurors are drawn.

Your committee trust that the amended system will make the incidence of service more general and equable.

LABOUR AND COAST AGENCY.

Your Committee regret to report that the number of immigrant labourers passing through the Coast Agency shows a decrease of 11,840 compared with last year.

The ultimate and best solution of the labour difficulty lies in an increased supply of immigrants, and to attain this the easiest method is to strengthen and extend the work of the Labour Commission in Southern India.

Local and recruiting (Coast) advances still show a tendency to increase.

The total estate contributions to the Coast Agency Scheme in 1909 amounted to Rs.72,567'68, representing 483,784 acres.

The expenditure was Rs.64,297-8-2, and the estimated expenditure for 1910 Rs.83,156.

PLANTERS' BENEVOLENT FUND.

The Standing Committee have met six times during the year, and the Fund continues to be of much value in assisting planters in sickness and those in reduced circumstances owing to age, infirmities or want of employment.

Thanks to the good work done in Great Britain by Mr. Thos. North Christie during the year the future of the Fund is assured, as subscriptions already amounting to some £7,000 have been promised to augment its capital.

The Committee most earnestly appeal to the whole Planting Community in Ceylon to worthily back up these generous donations, so that an annual income may be assured which will allow them to give pensions to worthy men whose life-work as planters is over, and to help and educate the children of those who have died, or who have not been so fortunate as others of their brother planters.

The question of reconstituting the Standing Committee and the regulations governing the administration of the Fund is before a Sub-Committee, and will be brought before the Planters' Association early in the coming year.

As to the disposal of the balance of Ceylon Tea Cess funds the "Thirty Committee" resolved on the 11th instant:—

"That as regards the balance of Cess funds no further appropriation be made for America, but that the funds be expended as opportunity offers in the Continent of Europe and elsewhere."

"That an appropriation of Rs.5,000 be made for administration expenses and contingencies in 1910."

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A revised edition of Messrs. De Zoete and Gorton's Manual giving capital and particulars of the London tea, coffee and rubber producing companies has been published. The manual is for private circulation only, and will be found exceedingly useful to all investors in plantation companies. The volume is arranged in four sections: (1) Indian tea companies, (2) Ceylon tea companies, (3) A Java tea company, (4) rubber producing and miscellaneous companies.

TEA.

The British Tea Trade.

In their circular dated January 19 Messrs. McMeekin & Co., 10, Lime-street, London, E. C., say (*inter alia*):—The trading conditions during 1909 have been more favourable than in the previous year, but the element of extreme, not to say unreasonable, competition still continues. . . . It has, however, been difficult for country dealers, and those in the blended and packet trades, to make up blends at sufficiently low costs to satisfy their customers and provide for themselves an adequate profit. . . . Trading has also been rendered more difficult by the higher prices ruling in the wholesale markets for sugar and the principle lines of provisions. . . . Some assistance has been given to the retail trade by the establishment of a "Fine Tea Fund," to which (having in view the hard times) many of the large wholesale houses made most liberal contributions. . . . Unfortunately, the funds subscribed have been inadequate to the work. Contributions were invited from the producers, but with all the prosperity that is so obvious in that section of the trade at present, the total subscriptions received from them were only about 10 per cent. of those given by the dealers. . . . It would be a good thing if producers generally of all classes of tea could grasp the fact that it is in their interest to raise the tone of the tea trade and to aim at an educative propaganda to make the demand from the public one for quality rather than for lowness of price. If part of the tea cess funds could be officially set aside for this purpose, far more ultimate good might arise from the expenditure than can possibly come from some of the disbursements now being made. It is doubtful if, even allowing for the rise which has taken place in price during the year, the consumers have, taking them over all, paid more per pound for their teas. The rate of consumption has increased to a considerable extent, having again made a record, and the average for the United Kingdom is very nearly 24,000,000 lbs. per month, or 6'30 lbs. per annum. In some quarters the increase is attributed to the more temperate habits of the present day, tea being taken more freely instead of alcoholic beverages, but there can be little doubt that the greatest contributing cause to the increased consumption has been the Old Age Pensions. There are various indications, in the directions from which the increased demand has shown itself, that the poor people who are enjoying the great blessings of what is to them comparative comfort, are unconsciously returning thank offerings to the Chancellor of the Exchequer in this particular way.

South Indian Teas.

The following extract from a London market report dated January 28, 1910, will be read with interest by planters in Southern India, as it points to an increased appreciation of their teas by consumers in the United Kingdom:—

"*South India*.—There was a good selection, and quality being mostly of a useful to desirable standard, a ready clearance was made on the basis of previous value.

"The best averages from the various districts were—Assam : Sealkotee 10½d., Balijan Co. 10½d., Lattakoojan 10d. per lb. Darjeeling : Pussimbing 1s. 5½d., Thurbo and Ting Ling 1s. 4½d. per lb. Doors and Terai : Meenglas 1s. 0½d., Chaloni 1s., Lankapara Co. 11½d., Nagaisurie 11d., Carron 10½d., Putharjhora 10½d., Hope 10d., Fllenbarrie and Gungaram 9d., Manabarrie and Newlands 8½d., per lb. South India : Non-such 9½d., Davera Shola 8½d., Kodanaad 8½d., Prospect 8½d per lb.

"For 47,300 packages on garden account 8d per lb. was obtained against 8-14d, per lb. for 43,300 in the week before and 7-75d, per lb. for 31,500 and 8-37d, per lb. for 39,500 in the two previous seasons."

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Tarring of Pruning Cuts.

Apropos of Scientific Officer's Note No. 14 which appears on another page it is interesting to note the following remarks by Mr. T. Petch, B.A., B.Sc., in a Peradeniya circular on "Die-Back of *Hevea Brasiliensis*" dated January, 1910 :—

"The diseased part should be cut off with a slightly sloping cut. It should not be too oblique, or the upper thin edge will die. If the dead portion is large it should be cut down in pieces, so as not to injure the lower branches. The cooly will no doubt prefer to use a catty, but if so the stem should be finally trimmed off with a saw to get a smooth surface. The removal of dead branches, which may afford an entrance for *Botryodiplodia* and other fungi, will have to become part of the general routine of a rubber plantation, and some coolies should be taught how to do this properly. The removal of a large branch requires three cuts with a saw. The first is made, about a foot away from the trunk, on the under surface of the branch and about half way through it; the second is made from the upper surface three inches further from the trunk, and continued until the branch breaks off. The double cut prevents any damage to the main stem. Finally, the stub must be sawn off as close to the stem as possible; it must be cut off flush with the stem, not perpendicular to the branch. This may give a bigger wound, but it will heal completely, whereas the bark will never grow over a triangular stub.

"The cut surface must be tarred to prevent the entrance of fungi. The heartwood of any tree is practically dead, and, if exposed, can be readily attacked by many fungi which could never obtain a footing on the tree under other circumstances. The progress of such fungi is slow, but the tree ultimately becomes hollowed out, or weakened to such an extent that it is broken by the wind. I have recently seen excellent examples of this. Five years ago, a number of *Hevea* trees were cut down because of canker. In some cases the trees forked from the ground level and only one of the stems was cut down, thus leaving a stump about two feet high united to the base of the remaining stem. These stumps were not protected in any way; and consequently they have afforded a point of attack for otherwise harmless fungi which have now destroyed them and have caused extensive decay at the base of the other stem, so much that many of the trees must die at no very distant date, since it is impossible to cut out all the infected wood without bringing the tree down. In another case, a tree forked at a height of about ten feet, and one of the stems was cut off; the fungi which

attacked the heartwood hollowed out the other stem until it snapped off in a moderate breeze. In this plantation, a trifling expenditure on tar would have prevented a loss of several thousand rupees. All wounds which expose the heartwood of a tree must be tarred.

"Coal tar should be used for covering the cuts. It is much more permanent than Stockholm tar and more effective against fungi. I am not aware of any evidence in support of the prevalent Ceylon idea that coal tar cannot be used to protect cuts on tea and Hevea, and to my knowledge it has been employed on tea in cases of branch canker without injury. Of course, the cooly should not be allowed to use so much that it runs over the healthy bark, and to avoid this it is better to use it cold. Hot tar is best, but there is more danger of injury. The cut surface should be as dry as possible, but it should not be left exposed for more than a day before being tarred. These two points may conflict in practice, and it is a matter for compromise."

Potatoes on the Nilgiris.

The following is extracted from a report by Mr. George Oakes on the cultivation of Potatoes from Australian Seed that was handed over to him by the Collector of Nilgiris:—

"The land selected was a portion of No. 173A of Kulhatti Village and was scrub and fern land of medium quality.

"The land was first cleared of undergrowth then broken up with the fork and then gone over with the mamoty, clods broken up, and weeds, roots and stones removed, the latter being utilized in forming revetments. The ground was then broadcasted with cattle manure, and again forked over.

The sets were planted in furrows which had a layer of cattle manure in the bottom covered with about 1 inch of soil, on which the sets were planted with eyes uppermost. The furrows were 24 inches apart, and the sets in the line 12 inches apart and 6 inches deep. After planting the whole of the land was broadcasted with unslaked shell lime from Calicut. At the time of planting the eyes were $\frac{1}{2}$ to $\frac{3}{4}$ inch long and in some cases rootlets had commenced to form round the eyes.

"The seed was ready for planting 15 days earlier, but the land was too wet from recent rains to be worked, so that it was not until the 12th September that it was possible to plant.

"In the case of very large potatoes they were cut into halves, but the remainder were all sown whole. I consider it is advantageous to cut the larger potatoes, provided the eyes will admit of it. After cutting, it is advisable to dust the cut surfaces with lime and sulphur to prevent any fungoid germs germinating, and it besides prevents any mildews forming. On the 5th October (the growth of the sets averaging 6 inches) a top dressing of chemical manure was given at the rate of 4 cwt. superphosphate and $\frac{1}{2}$ cwt. muriate of potash per acre. The manure was first thoroughly mixed, sprinkled on the ground, between the rows, and then lightly pricked in. On the 13th October the haulm being then 9 to 12 inches high ridging, or earthing up, was commenced, the growth being very satisfactory and no disease showing.

"On the 10th November the second ridging was given, which practically finished the cultivation. During the four months occupied by the experiment the weather was favourable; more rain in November would probably have added to the weight of the crop. September was on the whole a fine month, only 3.38 inches of rain being gauged. October was a wet month; rain fell on 19 days and measured 12.43. November was on the whole a fine month;

rain fell on 10 days only and measured 3'07. December was a dry month ; rain fell on three days only, and measured only 0'63.

"On the 10th January, the haulms being then perfectly dry, the crop was lifted and was found to be perfectly mature and free of disease. As is usual with newly imported seed the tubers averaged small, but as the crop was grown for seed it was an advantage rather than otherwise.

"The results are as follows:—

"Satisfaction" a pink variety of pebble shape potatoes with shallow eyes.

Sown 12-9-09	18 cwt.	crop lifted 10-1-10	73 cwt.
Brownells Beauty	8½ cwt.	"	35 cwt.
Cambridge Kidney	10 cwt.	"	25 cwt.

Brownells Beauty I consider a very good sample of a kidney potato, and it is an excellent cropper. Cambridge Kidney is rounder in shape than is expected in the kidney. It is pale pink in colour and would probably have cropped better, but had a poorer soil than the other two varieties.

"The total cost is as follows:—

Clearing, forking, revetting, &c.	...	273	12	0
Manure ...	...	191	12	0
Sowing ...	...	44	6	0
Ridging ...	...	10	0	0
Lifting crop	...	15	0	0
Watchmen one by day two at night	...	69	13	0

Rs... 605 5 0

"The weight of the crop is gross and will be sorted into 3 varieties large seed, seed and smalls. The value of the crop taking the weight as 690 maunds (of 25 lbs. each) at Rs.2 per maund would be Rs.1,218."

Flies.

Under date Pusa, the 16th February 1910, Mr. H. Maxwell Lefroy very kindly writes as follows:—

"On page 44 of *The Planters' Chronicle*, I notice the Scientific Officer's comments on flies; for some years now, Crude Oil Emulsion has been used both for keeping off flies, for healing sores and wounds on cattle, and for the prevention of leech-bites in leech country. The Crude Oil Emulsion is made in India and is obtainable at Rs.6-8-0 per 5-gallon drum in Calcutta, or at Re.1 per tin. The Scientific Officer is not probably aware of this compound, specially made as an insecticide at my instance and regularly used in India at the present time. The efficacy of this emulsion, which is not a 'patent' insecticide, compares well with any other, and its price is half that of the compound mentioned by the Scientific Officer. As I have successfully endeavoured to have this and similar insecticides made and sold in this country for the last five years, I hope you will be able to point out its virtues for the case mentioned."

Mr. Anstead did not know of the compound referred to, and desires that it should be brought to the notice of planters.

Mr. Lefroy sent also a pamphlet dated August 1904 on the subject of his letter, and from this the following is extracted:—

CRUDE OIL EMULSION.

"Among the best insecticides, Kerosene takes a high place, being safely applicable against many insects which can be poisoned only by a contact

poison, i. e., one that kills by outward application to their bodies and not in their food. Refined kerosene may be used (as described in a separate article) but the heavier unrefined oils have a greater and more persistent effect and are both economical and effective. The ordinary emulsions can not be made with the crude oils, and the best emulsions containing crude oil are made by a special process. Such an emulsion, containing 80% of crude oil, with 20% of whale oil soap, is prepared and sold, under the name of '*Crude Oil Emulsion*.' It was made at the Entomologist's suggestion, and analysis shows it to be pure, containing the ingredients given above.

"To use the emulsion, it needs to be mixed with cold water in the proportion of $\frac{1}{3}$ -pint to a kerosene tin of water (4 gallons). This amount measured and placed in a bucket or tin, is readily mixed with water by pumping water on it from a spraying machine or rubbing up the emulsion by hand. It makes a white milky fluid, remaining fit for use for several days, which needs no further preparation before being applied. This is the usual strength; it may be made twice as strong and can then be used safely on all but very delicate plants.

"Like kerosene emulsion, this is simply a useful contact poison. It is harmless to all animals if eaten and has a deadly effect on insects only when they are well wetted with it. It should be applied in the form of fine mist by means of a good spraying machine. For all soft insects, such as Aphids (green fly), Mealy bug, Thrips, Green bug, Leafhoppers, small caterpillars, etc., it is effective. One application kills the greater number, and a second application completes the effect.

"In gardens, on fruit trees, on ornamental plants, on vegetables, it is a useful application for these diseases and has a further use in driving off many other insects, which though not killed by it, find it objectionable. It has a certain value also in houses, which are infested with obnoxious insects, etc. It acts simply as high class insecticidal soap, with a less objectionable smell to carbolic preparations. In this way it is deadly to fleas for instance.

"It has a further value on domestic animals: kerosene is an excellent application for the skin and there is no better way of applying it than in the form of a soapy emulsion. For ticks, fleas, and other insects infesting cattle, horses, dogs, elephants, sheep, etc., this emulsion should be used, with excellent effects on the skin as on the insects."

—:O:—

M. Edmond Leplac, Director-General of Agriculture for the Belgian Congo, informed a representative of the *Times of Ceylon* at Colombo on the 19th instant that one of the first men to undertake the planting of rubber in the Congo was a former Ceylon planter, Mr. George Bemelmans, who was on an estate in Gallagedera, and has now for several years being planting at Bussia for a Belgian Company. This rubber, with the exception of Pará, yielded to fungus and various insect pests. Pará, however, is not by any means satisfactory. It grows to a good size, but the yield of latex is greatly inferior to that of the trees in Ceylon and Malaya. This is due to the shortness of rain, especially in the Lower Congo, where there is a three months dry season. The Government, however, has decided to persist in its cultivation, as the State, unlike to a private individual, can wait a long period for the trees to come into bearing and it will take no risks. The native taxes have now to be paid in money, and the proceeds are to be devoted to extending the plantations. The planting is to go on at the rate of 5,000 acres every year, and is beginning now, with the exception of experimental plots, on which there are trees at present about eight or nine years old. It is not expected to tap any trees before they are ten or twelve years old. The sum of fifteen million francs has been voted for rubber planting, of which $1\frac{1}{2}$ million will be spent every year.

Scientific Officer's Papers.**XVIII.—HOW TO USE FERTILISER ANALYSES.**

I suppose that no planter ever buys a fertiliser without reference to an analysis of its contents, but some of the analyses supplied to planters are often obscured, and made difficult to understand, by adding to them items of valueless materials and by stating the quantities of plant foods in several different ways. All this tends to make the man who is not used to interpreting chemical analyses think that he is getting more than he really does. This is often particularly the case in the way the phosphoric acid content is stated.

The following hints are written with the object of helping planters to understand what the analysis of manures supplied to them really mean, and to aid them in estimating the value of a fertiliser from its analysis.

In studying an analysis, if more than one figure of content is given always take the lowest; it is very seldom that a fertiliser contains more than the minimum amount quoted or guaranteed. Pay no attention to statements of moisture, carbonic acid, ferric oxide, chlorine, &c., which are sometimes given; these are not plant foods and are of no interest to the planter. Look out for repetitions. For instance, nitrogen is sometimes quoted as "equal to Ammonia." Ammonia is not nitrogen, it is only $\frac{4}{5}$ nitrogen, the rest being hydrogen which has no value as a fertiliser. Phosphoric acid is as a rule combined with lime in some form of phosphate. "Available" and "Soluble" phosphoric acid are the same thing, and the thing which is wanted; it is sometimes called, "water soluble phosphoric acid." Insoluble phosphoric acid has no value to the plant until it becomes soluble so that the plant can get it. It may gradually become soluble in the soil and so it is usual to count it as worth half as much as soluble phosphoric acid. "Reverted phosphoric acid" is that which was once soluble but has gradually become insoluble; if the soluble phosphoric acid in the soil is not used quickly it reverts. This form is often stated in an analysis as "citrate soluble," or "soluble in citric acid," this being a weak acid corresponding to the acids secreted by roots. It may be considered as about as valuable as the soluble phosphoric acid, but not quite. In the case of Potash, it is often given as "equal to sulphate of potash" or muriate of potash; only about half of these are plant food potash. The following conversion table will be found useful:—

To convert Ammonia into Nitrogen multiply by	0.82
" " Nitrate of Soda " "	0.16
" " Sulphate of Ammonia Nitrogen multiply by	0.21
" " Muriate of Potash "Potash"	0.63
" " Sulphate of Potash into Potash multiply by	0.54
" " Bone Phosphate "Phosphoric acid"	0.45
" " Tricalcium phosphate " "	0.46

The value of a commercial fertiliser, as distinguished from a green manure, or animal manure, which supplies humus, depends solely upon the amount of plant food which it contains, and only this and its cost should be considered when buying.

Let us take an example. Suppose that the following analysis is given with a fertiliser:—

1. Moisture	8.48
2. Organic matter	37.37
3. Contains Nitrogen equal to ammonia	5.68
4. Insoluble Silicates	4.05
5. Total Phosphoric acid	9.24
6. Containing Phosphoric acid soluble in water	4.27
7. Equal to Tricalcic phosphate	9.32
8. Containing Phosphoric acid soluble in Citric acid	1.57
9. Equal to Tricalcic phosphate	3.42
10. Aluminium Oxide	15.0
11. Potash	4.68
12. Equal to Sulphate of potash	8.66

(This is a purely fanciful fertiliser and not the analysis of a Coffee manure which can be bought).

The first thing to do is to strike out items 1, 2, 4 and 10 as being immaterial, and 7, 9 and 12 because they are restatements of 6, 8 and 11, respectively. Next reduce the Ammonia to Nitrogen by multiplying by 0.82 = 4.65. Add together the water soluble and citric acid Soluble phosphoric acid as being equally valuable, 5.84. Since there is a total of 9.24 of phosphoric acid and only 5.84 is given as soluble, it may be assumed that the rest = 3.4 is insoluble; this has half value.

The analysis is now simplified to the following :—

Nitrogen	...	4.65	|	Insoluble phosphoric acid	...	3.4
Available phosphoric acid	...	5.84	|	Potash	...	4.68

Now calculate the plant foods contained in a ton thus :—

Nitrogen	...	...	4.65%	of	2,240 lbs.	=	104.2 lbs.
Available phosphoric acid	...	...	5.84%	of	" "	=	130.8 "
Insoluble phosphoric acid	...	...	3.4%	of	" "	=	76.2 "
Potash	...	...	4.68%	of	" "	=	104.8 "

Now all we have to do to find the correct value of the fertiliser is to multiply each of these amounts by the trade value per lb. and add them up. This trade value per lb. is a figure which I am not yet familiar enough with the prices of Indian fertilisers to determine, but judging from the figures given by Dr. Lehmann I think we may take the values used below as approximately correct. At any rate they will serve the purpose of our example and show how to proceed :—

Nitrogen	104 lbs.	at 10 annas per lb.	=	Rs.	65	0	0
Available phosphoric acid	131	.. at 3	=	..	24	0	0
Insoluble phosphoric acid	76	.. at 1 as. 6 p.	=	..	7	12	0
Potash	105	.. at 3 annas	=	..	19	11	0
				Rs.	116	7	0

This gives the value of the plant foods in the fertiliser per ton. Something must be added for bagging, and profit of course, and then freight has to be considered.

Whenever possible a fertiliser should be bought on a guarantee, and by working out the price by the above method against the guarantee no one can make a mistake as to the theoretical value. As a general rule it will be found that plant foods can be most cheaply bought in a concentrated form so that freight is not paid on useless stuff such as, for instance, insoluble silicates (sand) in our example analysis.

RUDOLPH D. ANSTEAD, *Planting Expert.*

On return from a trip round the world Dr. J. C. Willis, Director of the Royal Botanic Gardens, Peradeniya, stated that he had devised a considerable series of experiments to be carried out in Ceylon with the view to test the whole question of strength, and discover the real reason why the strength of the cultivated rubber is different from the strength of the wild rubber and, what is still more important, why the strength of any two samples of cultivated rubber is not the same. "That has been decided upon, but the task will involve several months of hard work. Take South American rubber, it is almost uniform in strength. Cultivated rubber is not. We want to find out what is the cause of the variable strength of the cultivated rubber and devise some method which will turn out rubber of an even strength. One of the principal faults to be found by manufacturers with cultivated rubber is its uneven strength. They cannot mix it for good work. As regards the rubber expert, we are still at practically the beginning of our knowledge of rubber, and any man who is prepared to work conscientiously at rubber is bound to find out a good deal if he is a man of reasonable intelligence."

Notes and Comments by the Scientific Officer.

12. *Hariali Grass*.—In reply to a correspondent, Hariali grass is *Cynodon dactylon*, and is sometimes called Bermuda grass.

The best way of propagating it is to cut it up into pieces about an inch long and sow these broadcast just before the monsoon, covering them with a thin layer of sand to keep them in place. In the West Indies tennis lawns and cricket grounds are made of this grass.

13. *Magnesia in Lime*.—When buying limes for agricultural purposes, the main point is to have a guarantee of the percentage of pure lime, which should be over 85. It is also desirable that there should be a guarantee that the lime does not contain more than 4% of magnesia. There should also be no appreciable amount of unburned limestone, or chalk, left in the lime: this can usually be detected by the presence of lumps of unburned stone or shell which will not slack with water.

Magnesia should not be present, because salts of magnesia exert, even in dilute solutions, a poisonous action on plant roots, and an excess of magnesium in the soil results in sterility. In support of this, A. D. Hall, in his excellent book upon the soil, which by the way should be in every planter's library, points out that soils resting upon the Serpentine, which is a Magnesium Silicate, are notoriously poor, and also that certain impoverished clays on the Wealden formation in England are rich in magnesia.

For further information about the use of lime reference should be made to Sc. O. paper IX.

14. *Tar for Pruning Cuts*.—Enquiries are constantly being made as to the best kind of tar to use as an antiseptic dressing for wounds on trees made by pruning or other causes. Stockholm tar, which is largely used, and which finds great favour in Europe, will not stand the temperatures usually experienced here, and in the hot weather it runs. Coal tar properly applied is the better of the two under our conditions, but a lot depends upon that "properly applied." The wound should be if possible made at a slope of 45 degrees, or parallel with the primary stem, and should be pared down to a perfectly smooth surface, the edges of the bark being carefully smoothed off. The tar should then be applied to the cut surface only and not allowed to spread over the surrounding bark or to run down the stem, for it undoubtedly has a tendency to burn the bark. The best way to apply it is with a small paint brush and not a rough brush made of coconut fibre. Several brushes of different sizes should be kept for use on wounds of varying sizes, and the tar should be neatly applied. The extra cost of such brushes will be more than covered by the tar which is saved instead of wasted, and better results will be obtained in the way of quick healing wounds.

A better antiseptic dressing than coal tar will be found in Rosin Oil, but this cannot, I believe, at present be obtained in India. Steps are being taken, however, to arrange for its importation. This dressing does not burn the bark, and young bark grows rapidly over it, while it keeps out moisture, insects and fungi.

RUDOLPH D. ANSTEAD, *Planting Expert*.

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In the Philippine Agricultural Review Mr. C. F. Miller gives a brief account of his experience in growing the Ceará rubber tree, *Manihot glaziovii*, on Basilan, Philippine Islands. Consideration is given to germination and planting, pruning, tapping, coagulation, the raw rubber, and soils. Fifty trees 3½ years old when tapped yielded a total of 5 lbs. of rubber. Each tree was tapped 3 times, thus giving a little over ½ oz. per tree for each tapping.

DISTRICT PLANTERS' ASSOCIATIONS.

Wynaad Planters' Association.

*Proceedings of a Special Meeting held at Meppadi Club on
February 16th, 1910.*

PRESENT:—Messrs. Atzenwiler, Behr, Elphinston, Emerson, Ewart, Hal-
liley, Malcolm, Mead, Parry, Powell, Trollope, Winterbotham,
West and C. E. Abbott, (Hon. Secretary).

By Proxy.—Messrs. Brown, Carslake, Hockin, D. Mackenzie, Nicolls,
Robinson, Richelmann, Romilly and Taylor.

Visitor.—Mr. C. W. E. Vernede.

Mr. Atzenwiler in the Chair.

1556. *Association Rules.*—Mr. Mead proposed in accordance with
notice given at last Meeting, "that in future subscriptions to the Wynaad
"Planters' Association be levied on an acreage basis; and that each estate
"be entitled to 1 vote for every 50 acres of cultivation on which subscription
"has been paid."

This was seconded by Mr Behr.

Amendment proposed by Mr. Atzenwiler; "That the Association revert
"to the system of subscription in force up to December 31st, 1908, *viz.*, indi-
"vidual membership at Rs.18 subscription per annum, and no acreage
"subscription." This was seconded by Mr. Winterbotham.

Amendment proposed by Mr. Trollope: "That in future subscriptions
"to the Association shall be levied as at present; and each estate shall be
"entitled to one vote for every 50 acres of cultivation; but that each mem-
"ber of the Association shall be entitled to at least one vote; subject to the
"total votes of any one person, company or syndicate, inclusive of the votes
"of all its employees, not exceeding at any time one-third of the total votes
"of the Association." Seconded by Mr. Malcolm.

Mr. Trollope's amendment was carried by 15 votes to 7.

ORDINARY GENERAL MEETING.

THE SAME MEMBERS WERE PRESENT.

1557. *The Proceedings of the last Meeting were confirmed.*

1558. *New Members.*—Mr. Emerson was elected as a Member of the
Association.

Mr. R. D. Anstead, Scientific Officer, was elected an Honorary Member.

1559. *Dates of Meetings in 1910.*—It was decided to hold Meetings
on the second Wednesday of each month except in April and May, in which
months no Meetings will be held.

1560. *Reports of Proceedings.*—After some discussion it was decided
to have the Proceedings printed separately as hitherto.

1561. *Labour Law. Mr. Bisset's case.*—Read letter dated January
18th from Collector of Malabar enclosing extract from the Vayitri Sub-
Magistrate's report; and stating that as no written application filed by Mr.
Bisset the Collector could not deal with the case. Also letters from Mr.
Bisset dated February 1st and 16th.

Read G. O. No. 1 dated January 3rd empowering M. R. Ry. M. Istunni
Rama Panniker, third class Magistrate, Vayitri, Malabar, to perform the
functions of a Magistrate under the Act.

Read G. O. No. 21 dated January 4th stating that Government are of opinion that the expense incurred in producing a maistry or labourer before the Magistrate under section 35 should be borne by the State.

Read G. O. 77 dated January 12th authorising Mr. W. E. Glenie to attest contracts under the Act.

1562. *Agricultural Experiments*.—Read letter from Mr. Anstead forwarding herbarium of leguminous plants suitable for green dressings found on his recent tour in Wynaad.

This can be inspected at the Meppadi Club.

1563. *Coffee Cess*.—Read letter dated January 31st from Honorary Secretary to the Secretary U.P.A.S.I. which was approved.

1564 *Scientific Officer's Fund*.—Honorary Secretary reported that he had paid a quarter's subscription to this fund.

1565. *Income-tax Arrears*.—Read letters from Collector dated February 3rd and 6th and Honorary Secretary's reply. Recorded.

1566. *Member's Subscription*.—The Meeting decided to write off the 1909 subscription of a Member who has left India.

1567. *Poodapardy Hotel Stable*.—The Honorary Secretary was authorised to pay Rs.14-6-0 for repairs.

1568. *U.P.A.S.I. Papers*.—Read Circulars 3 and 5 informing us that Mr. Romilly regrets that he is unable to attend the Meeting of the Tea Cess Committee, and that the Government of India regret they are unable to raise the tax on tea imported into India to 4 annas per lb.

1569. *Papers on table*.—I. T. A. Circulars, Rules for election of Taluq Board Members.

A vote of thanks to the Chair terminated the proceedings.

(Sd.) H. ATZENWILER, *Chairman*.

C. E. ABBOTT, *Hon. Secretary*.

A good deal having been written regarding Palo Amarillo (*Euforbia elastica*) Rubber of late, it is of interest to learn that Mexican notes on this tree relative to the chemical composition of the latex and its exploitation as a rubber producer show that the quantity of rubber in the latex is only about 10 per cent., and the product obtained by simple methods contains 50 parts per 100 of resins, which prohibits its being vulcanized. The product can be freed from the resins only by costly machinery, which the quality of the rubber does not appear to justify.

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In an interview with a representative of the *Times of Ceylon* on the 19th instant, Mr. Titoff, of the Russian Trading Company, said that undoubtedly the reason why Russia had taken less Ceylon tea was partly the defective grading of teas on estates and inferiority of leaf. This was not the case in India. Indian leaf was always better than Ceylon, but the planters of that island, if they paid proper attention to the matter, could turn out teas more suitable for the Russian market than they had been doing.

"The teas are not properly sifted," he remarked, "and are full of red stalk. They were much worse last year than in previous years. We took 26 millions from India and a large quantity of Java tea, which is increasing rapidly in favour in Russia. Russian buyers are very satisfied with Java teas, especially as regards leaf, which has greatly improved and is even better than Indian. Another reason has been the shortage of common teas due to the planting of rubber among the tea."

TEA.

Tea in Persia.

In his report for the Persian fiscal year March 22, 1908, to March 21, 1909, on the Trade of Bushire, Mr. Vice-Consul Chick says concerning Tea :— Though the total amount of tea which passed through the Customs fell from 16,656 cwts. in 1907-08 to 13,670 cwts. in 1908-09, there is no doubt that owing to the large amounts smuggled there was no reduction of the heavy stock in the country. Disorders in the interior reacted unfavourably on sales in the commercial centres, and prices therefore kept very low. As an illustration of the loss inflicted on *bonâ fide* trade and the general upsetting of prices, a Persian trader bought at 17 krans per man of 7½ lbs. a quantity of tea, which was brought into Bushire from Borazjun, 45 miles inland, the wholesale price of which in Bushire, when imported through the customs, was 22 krans per 7½ lbs.

Smuggling during the last three years has increased by leaps and bounds, as the following figures will show:—

	1906-07.	1907-08.	1908-09.
	Cwts.	Cwts.	Cwts.
Bahrein	930	1,500	2,470
Koweit	758	146	171
Sharqah	---	160	---
Dubai	---	212	308

Traders who do not scruple to have their goods smuggled are able to introduce tea at small ports 20 and 30 miles from Bushire and dispose of it on the market in Shiraz at a profit of 10 toman (say £2) per chest, whereas the *bonâ fide* merchants have constantly lost that amount or less on tea which has duly paid customs duty. The cause of this smuggling lies in the prohibitive rates of duty on the ordinary Calcutta tea fixed by the tariff of 1903, *viz.*, 6 krans (2s. 2d.) per batman of 6½ lbs. As the usual quality of Calcutta tea imported costs 4½ to 6 annas per lb. in the market, the duty is not much less than 100 per cent. On the other hand, the other Gulf ports, Bahrein and Koweit, charge duty at 5 per cent. only, while Dubai is practically a free port. Normally this difference offers every opportunity to smugglers, which the disorganised state of Government in Southern Persia has of late rendered all the more easy. The interests of commerce demand preventive legislation to combat the loss caused by smuggling both to the State and to its traders, but in view of the low rates of duty prevailing in other non-Persian ports of the Gulf and their proximity and the long line of sea coast for the customs to control, the policy indicated is a reasonable reduction of the rates of duty into Persia.

Animal Parasites and Diseases.

In a somewhat lengthy bulletin of the Department of Agriculture, Dutch East Indies, the subject of Animal Parasites and Diseases of the Tea Plant is discussed.

Part I of this work (PP. 1-39) is a general report of preliminary observations of the animal and vegetable parasites, including a bibliographical index.

In Part II (PP. 41-148), the acarids which attack the plant, including the so-called red spider *Tetranychus bioculatus*, scarlet mite *Brevipalpus obovatus*, yellow mite *Tarsonemus translucens*, five-ribbed tea mite *Phytoptus carinatus*, and the pink mite (*P. theæ*), and the remedies therefor, are considered at some length. Next to the so-called mosquito blight due to species of *Helopeltis*, the red spider is said to be the worst pest of the tea plant that occurs in Java.

COFFEE.**Diseases.**

In the course of his interesting series of "Miscellanea : chiefly pathological" in the *Tropical Agriculturist* Mr. T. Petch, B.A., B. Sc., writes in the February issue :—

"The destruction of Ceylon coffee by *Hemileia vastatrix* led to its total abandonment in the Island. Other countries, profiting no doubt by Ceylon experience, have been able, by adopting different methods of cultivation, to retain this product in spite of the attacks of leaf disease. In some of these countries the search for species which are immune or resistant to *Hemileia* has been consistently pushed for many years, without any striking success. Java at one time thought that the desired species had been found in *Coffea robusta*, but further experience has not justified that idea. Dr. F. C. von Faber, writing in the *Tropenpflanzer*, states : '*Coffea robusta* has been especially cultivated in Java, and does not appear to be very resistant to *Hemileia*. This plant is comparatively weak, and therefore suffers more than Liberian coffee when it is attacked. At Buitenzorg, this species is regularly attacked by *Hemileia*. The great expectations which were based on *Robusta* coffee do not appear to have been altogether realised.' Other species are now being boomed, the chief of these being *Coffea congenensis*, but trials on a large scale for an extended period have yet to be undertaken. *Coffea robusta* is now being planted as a catch crop in rubber; it may yield a paying crop under such circumstances, but it is as well to remember that it is not exceptionally resistant to *Hemileia*.

"From Costa Rica samples have been received of a coffee disease which does not appear to have been noticed in the Ceylon coffee days. The disease affects beans only. The bushes on which the diseased beans are found are quite healthy, and the 'cherry' does not show any indications which would lead one to suspect that the beans were unsound. But the beans are found to be blackened and disorganised, and such black beans have altogether lost their natural aroma. The cause of the disease does not appear to have been ascertained. One observer states that the mycelium of a fungus occurs in the blackened beans, but this is not regarded as definitely established, and the effect is thought to be due rather to physiological causes. The disease seems to have been known for a long time, but in recent years it has become more prevalent and in some cases has destroyed eighty per cent. of the crop. I have not been able to find any record of it in Ceylon, but a coffee planter from Southern India informed me that it sometimes occurs there on the second crop."

Coffee in Tonkin.

An Indo-China Bulletin, by Mr. P. J. S. Cramer, states that in the course of a visit to the coffee plantations of Tonkin a study was made of the virescence of the flowers of *Coffea arabica*. This trouble manifest itself in two forms. In one the flower is greatly reduced in size, and the petals are entirely green. In the other form the flowers are nearly white, the petals are twisted, and the pistils and anthers are aborted.

The conclusion is reached that the virescence of the flowers is a physiological phenomenon caused by whatever affects the nutrition of the plant, whether climatological, pathological, or agrological. The author suggests that conditions other than climate can be ameliorated by removing all excrescences which develop on the trees and by adopting a method of pruning which provides for constant renewal of the top of the tree. The conditions of climate and soil may be ameliorated somewhat by the use of companion and shade crops.

RUBBER.**Analytical Notes.**

The Agricultural Bulletin of the Straits and Federated Malay States gives certain Analytical Notes of Rubber Plants in the Botanical Gardens, Singapore, from which the following is extracted :—

HEVEA BRASILIENSIS.

The latex was obtained from one 32 year old tree, tapped at 6-30 a.m. No water was added to the latex, and the formalin added was carefully measured, so that the amount of pure latex is known. In the figures given below this formalin has been corrected for so that they refer to pure latex.

The total yield from this tree at one tapping was 27 fluid ounces of latex. It was thick, white, and of very agreeable odour. . . . The dry rubber has the following composition :—

Rubber	...	...	...	98'14%
Resin	...	...	...	1'86%
				100'

Albumens were not determined (as they should be for strictly accurate results.) Their amount is small compared to the total, and the usual acetone extraction gives figures that are near enough to the truth for all ordinary purposes.

The analysis of the latex is :—

Coagulum	36'29%	...	...	( Rubber	35'55%
				(Resin	0'67%
				(Ash	0'07%
Serum Solids	2'63%	...	...	( Organic Mater	2'30%
				(Ash	0'33%
Water	61'08%	...	...	( Water	61'08%
				100'	100'

The solids soluble in water, (tannins, colouring matters, pentoses, gums, sugars of the inosite group, etc.,) form a brown sweet smelling mass of extremely hygroscopic nature. The strength and appearance of the rubber were very fine. The percentage of 36% coagulable matter in the latex is very high for Pará and is in accordance with the rule that the percentage of rubber in a latex increases as the tree gets older.

MANIHOT GLAZIOVII.

The specimen examined was taken from a large tree in the Botanical Gardens, Singapore. The bark was quite unlike that of most rubber plants, having a very thin outer bark. This came away from the tree very readily when the knife was used and a large surface of the same was stripped back. On this exposed place, a herring-bone tap was made, retapped again on the following day, and again two days later. The latex tubes are very near the outer surface of the inner bark, and these few successive tappings did not increase the flow of latex to any appreciable extent.

Unlike *Hevea brasiliensis*, the latex coagulated quickly in the cut, so that the flow ceased almost immediately; in fact, it was quite impossible to collect it in cups for this reason. The rubber collected was obtained by stripping it from the cuts. It had a very disagreeable herb-like odour. Analysis gave the following figures calculated to dry weight ;—

Rubber	...	...	90'44%
Resin	...	...	6'83%
Ash	...	...	2'73%
			100'

The rubber is fine and tough, tougher than Plantation Pará, and very light straw yellow in colour. The ash could, of course, be reduced to a negligible amount by washing.

The Planters' Chronicle.

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The Scientific Officer.

Mr. Anstead left on Tuesday morning (1st instant) and proceeded to Mudigere to the estate of the Hon'ble Mr. J. G. Hamilton, in connection with Coffee hybridisation experiments. Only a short stay is contemplated, as it is hoped that arrangements will be made very shortly for a tour in the High Range and Central Travancore.

PROPOSED VISIT TO CEYLON.

The Committee of the Nilgiri Planters' Association consider that it may be of advantage to him in his work if the Scientific Officer pays a visit to Ceylon and gets into personal touch with the Ceylon people who are working on the same lines as himself.

The Honorary Secretary to the above Association writes :—

“I am instructed to offer Rs.200 towards the expenses of this trip, should it come off.

“I have no doubt, if the idea is acceptable, that the remainder of the money required to cover the expenses of the trip can be subscribed by the other Associations interested.”

The matter is under the consideration of the Council of the U.P.A.S.I.

PROPOSALS OF THE MADRAS GOVERNMENT.

The Secretary to the Government of Madras, Revenue Department, has submitted a copy of the undernoted official paper and has inquired if the U.P.A.S.I. has any objection to the proposals therein contained. A reference has been made to the Council, for instructions.

Copy of Board's Reference No. 271, dated 7th February, 1910.

“Read the following paper :—

“Letter from M. E. Couchman, Esq., I.C.S., Director of Agriculture, Madras, dated 19th January 1910, Dis. No. 151.

“With reference to paragraph 2 of B. P. No. 4410 Misc., dated 22nd December 1909, I have the honour to submit the revised re-appropriation statement. It is presumed that the travelling allowance of Mr. Anstead and the contingent charges of his establishment are to be borne by Government as nothing has been said in the G. O. about these items. Provision has accordingly been made in the statement for the expenditure on these two items.

"Reference thereon No. 271, dated 7th February, 1910.

"Submitted to Government for favour of sanction with reference to paragraph 3 of G. O., No. 3443 Revenue, dated 15th December 1909.

"2. The Board considers that the presumption expressed by the Director in regard to the payment of travelling allowance of Mr. Anstead is correct and in accordance with the concluding sentence of paragraph 3 of G. O., No. 1655 Revenue, dated 22nd June 1909. As regards contingent charges, it seems to the Board that they cannot be distinguished from other office expenses (cost of establishment, travelling allowance of establishment, office rent, etc.) for which Government have agreed to allow the United Planters' Association of Southern India a yearly contribution of Rs.1,000-Vide G. O., No. 3443, dated 15th December 1909."

Analytical Notes.

Under the head of "Rubber" certain Analytical Notes of Rubber Plants in the Botanical Gardens at Singapore were extracted in last issue from the *Agricultural Bulletin of the Straits and Federated Malay Straits*. As the Jāk tree is sometimes looked upon as a possible rubber producer, it is advisable to publish yet another extract from the same series of Analytical Notes. This reads as follows:—

ARTOCARPUS INTLGRIFOLIA.

"The specimens examined were common Jack trees. The latex ran very well from herring-bone tappings. It was thin and very sticky, neutral in reaction to litmus.

"Attempts to coagulate it were unsuccessful, but it was found the agglutinated solid matter could be separated from the serum by filtration on paper.

"A small percentage only was found to be insoluble in acetone, and this was found to be a white powder, neither rubber nor gutta percha.

"Analysis of the latex gave:—

Coagulum	..	26.79 per cent.	(	Solid insoluble in acetone	2.37 per cent.
Serum solids Gums, pectins,			(	Resin Soluble	24.42 ..
albumens etc.	...	8.85 ..			8.85 ..
Water	.	64.36 ..		...	64.36 ..
		100			100

"The resin is a beautiful clear yellow, semi-solid mass, and is extremely sticky. This and a powder of unknown nature are the chief components of this latex, it containing no rubber whatever."

A Planter's Present Address Wanted.

Writing under date Coimbatore, February 24, 1910, Messrs. T. Stanes & Co., Managing Agents, The United Coffee Supply Co., Ltd., remark:—

"As we are anxious to communicate with a Mr. M. W. Litton, one of the shareholders in this Company, whose address we are unable to find, we shall be very much obliged if you will kindly insert this letter in the *Chronicle*; and if any of your readers happen to know Mr. Litton's whereabouts and would kindly put us in touch with him, we shall be greatly obliged. We believe he was formerly a planter in Coorg or Mysore."

It is hoped that any reader of this paper who is in a position to give the information required will kindly communicate with Messrs. T. Stanes & Co., Coimbatore.

Lead Chromate as an Insecticide.

The following pamphlet on the substitution of Lead Chromate for Arsenical preparations as an insecticide has been received from the Agricultural Research Institute at Pusa, and is published for the information of planters :—

The insecticides here dealt with are usually used to kill insects, like caterpillars, which actually eat the leaves and stems of the plant. When such leaves are coated with a poison it is taken in with the food. In the case of sucking insects such insecticides are useless because the poison cannot be introduced into the sap on which the insect feeds.

LEAD CHROMATE.

A SUBSTITUTE FOR LEAD ARSENIATE AND ARSENIICAL INSECTICIDES.

"There are grave disadvantages in India in the use of arsenical poisons as insecticides, and for many reasons we have endeavoured to find a reliable substitute. Formerly Paris Green was used in India, as elsewhere, as a standard application; in 1903 Lead Arseniate was introduced and arrangements made for its manufacture and sale. We have now abandoned Lead Arseniate in favour of a non-arsenical preparation, one of many hundreds that have been tested at Pusa during the last four years. This is Lead Chromate, a compound that is poisonous to human beings and cattle, but which has not the very grave disadvantages attaching to arsenic. It is cheaper than Lead Arseniate, and arrangements have been made for its sale at annas 13 per lb. in paste or power, the paste being sold on its Lead Chromate content and not its bulk weight. For ordinary users, lead chromate is most easily made by dissolving separately two parts by weight of a lead salt, e.g., lead acetate or nitrate, and one of Potassium bichromate; the solutions are mixed and two parts of lead chromate precipitated. In this way the substance is made in its best form for spraying. The simplest procedure is to dissolve the lead salt in the spraying machine, and to dissolve the bichromate separately in a tin of water and then pour it into the spraying machine.

"Lead Chromate is a heavy yellow substance, easily visible upon the plant, which does not burn the foliage, which adheres extremely well in spite of wind and rain, which does not decompose into compounds that burn the plant. It has been used on a great variety of crops in the Pusa farm; leaves sprayed heavily with it have retained it for six weeks in spite of heavy rain, and the leaf has remained healthy. Plants can be sprayed with it till they are yellow, and no harm is done. The substance is not as poisonous as lead arseniate or Paris Green, but is a first rate deterrent to plant feeding insects; sprayed plants will not be eaten by insects.

"We recommend a strength of 1 lb. in 64 gallons of water, as an insecticide on crops that are being attacked, or 1 lb. in 100 gallons of water as a deterrent upon crops which it is essential to protect from attack.

"Applied at these rates, no harm is done to fodder crops, which can be safely fed to cattle, and unless the spraying is done very badly and all the Lead Chromate applied at one spot, no poisoning effect would follow upon any crop or plant if eaten after.

"For the Knapsack spraying machine, 1 ounce of lead acetate may be dissolved in the machine, $\frac{1}{2}$ ounce of Potassium bichromate powdered, dissolved and added; or $1\frac{1}{2}$ oz. of paste or 1 oz. of dry chromate may be thoroughly rubbed up in the machine.

(Sd.) H. MAXWELL-LEFROY,
Imperial Entomologist.

Scientific Officer's Papers.**XIX.—WEEDS.**

A great deal has been written lately about the relative merits of clean weeding, and the intelligent use of weeds, and in this discussion the word "weed" is often used in a loose sense, and leads to confusion of ideas. A weed is a plant in the wrong place, and such should be religiously exterminated, but this does not mean that a system of clean weeding should be necessarily adopted. What is advocated by some of us is the intelligent use of certain kinds of plants as cover crops, which when thus used cease to become weeds in the true sense of the term.

Mr. R. H. Lock, in a paper read before the Ceylon Board of Agriculture at the February meeting of that body, brought this point out very well. Mr. Lock, said :—

"There has recently been some discussion in the local press as regards the uses of weeds. As I have already pointed out, it would simplify matters a good deal if the term 'weed' were confined to plants when and where they are useless, or at least where the disadvantages of their presence outweigh the advantages; and if the rule were made to apply some other term to plants which are grown or allowed to grow for a specific purpose.

"Plants, which are weeds under certain circumstances, may under other circumstances have the following recognised uses :—

1. The use as nitrogenous plants grown for the purpose of enriching the soil in this most important element.
2. As Cover plants grown to shade the soil and to enrich it with added humus, but not necessarily with nitrogen.
3. Plants grown on steep slopes in order to check wash.
4. Shade plants and wind breaks.
5. Sand binding plants, which prevent the spread of shifting sands.
6. Climbing plants grown for the purpose of smothering particular weeds.

"Any one of these six headings might easily form the topic of a separate paper at least as long as the one which I have now had the honour of reading to you. But I wish it to be clearly understood that in speaking of weeds I have intended to exclude all plants which are used for any of these perfectly legitimate purposes.

While opposing a system of clean weeding, and the keeping of the soil absolutely bare and devoid of all plants except the specific crop, I would emphasise the fact that it is most important to eliminate certain plants which are known to be harmful. These, in my opinion, should be replaced by cover crops of other plants, leguminous for preference. In order to establish these, clean weeding must be adopted in the first instance to get the land clear, and to arrive quickly at this state of affairs it is important to remember what Mr. Lock says at the opening of his interesting paper, viz :—

"The first principle in destroying weeds is to attack them before they have time to ripen seed."

RUDOLPH D. ANSTEAD, *Planting Expert.*

Notes and Comments by the Scientific Officer.

15. *Basic Slag*.—I have received a number of enquiries about the use of Basic Slag, and my paper on Phosphatic Fertilisers in the *Planters' Chronicle* (Sc. O. papers, XVII) deals with most of these. Probably the best time to apply it is in the dry weather before the monsoon, as it can then be more easily mixed intimately with the surface soil, which is important. Since it is an alkaline fertiliser and contains lime care must be taken about mixing it with nitrogenous manures. It must never be mixed with Sulphate of Ammonia, or a portion of the ammonia will be lost. It is best to treat it like lime and not mix it with any form of nitrogenous fertiliser, and leave the monsoon period, or a period of 6 to 8 months between such applications.

Its effect is usually felt during the first two years after its application, and it is especially suitable for heavy clay soils deficient in lime, but containing plenty of acid vegetable matter.

With regard to its value as compared with Bone Meal, it is difficult to give a direct answer. Probably Bone Meal is a better fertiliser on most soils, but bone meal is difficult to obtain finely ground, and bones applied in coarse pieces are of little value.

Comparative tests on similar plots between Basic Slag and Bone Meal would be most valuable and interesting.

16. *Bordeaux Mixture*.—A correspondent enquires about Bordeaux Mixture, and the following information has been supplied by Messrs. J. B. Forster & Co., of Bangalore and is published for general information.

Messrs. J. B. Forster & Co. can send out Bordeaux Mixture in two separate concentrated solutions, in Stone-Ware Jars, each holding two gallons. The contents of each jar should be made up to 50 gallons with water, and mixed together in equal proportions as needed. Bordeaux Mixture will not keep, and only as much as can be used should be made up each day.

The two jars will make 100 gallons of the mixture, and cost Rs.7-8-0, including jars.

17. *Flour Phosphates*.—The following information has been kindly given me, in answer to an enquiry on the subject, by Messrs. T. Stanes & Co., Coimbatore :—

The "Flour Phosphates" which we sell is prepared from the Phosphate nodules obtainable round Trichy. The phosphate in these nodules is of course in an insoluble form, and it is therefore necessary to grind it very fine, and the resulting fine powder was given the name of "Flour Phosphate," by the late Messrs. Arbutnot & Co., who originally prepared this manure by means of a machine which we now possess after purchasing their Kallai Works.

A sample has been received at this office, and the fertiliser is in the form of a very fine brown powder. Messrs. Stanes give the following analysis of it :—

Phosphoric acid	...	...	..	27'38
Lime	...	...	..	43'94
Insoluble silica	...	...	...	23'36

but do not state how much of this phosphoric acid is immediately available, It is probably a slow acting fertiliser of the nature of Basic slag.

RUDOLPH D. ANSTEAD,

Planting Expert.

INDIAN TEA CESS COMMITTEE.

Advertising in America, 1909-10.

The following report by Mr. R. Blechynden, the representative of the Indian Tea Cess Committee in the United States, upon the work done during the third quarter of the season 1909-10, is published for general information :—

India Tea American Advertising Fund, Season 1909-10.

Report for Third Quarter.

I have the honour to submit my report for the three months ending 31st December 1909, the third quarter of the current season.

2. The system of work described in previous reports remained unchanged, but was slightly expanded in the matter of recognizing future deliveries as a basis for present advertising: this point is dealt with in another paragraph.

3. The territory we entered upon during the previous quarter in Michigan and Wisconsin occupied much of the time, and the salesmen's routes carried our specialty men into parts of Minnesota and North and South Dakota.

The work in Denver, Colorado, was completed, and several of the more important points in Colorado were visited.

A small section of Kansas was taken up and completed toward the close of the quarter.

4. Newspaper advertising has been continued on the regular plan we follow: large advertisements appear in all the local leading papers during the time a section is being visited: later these are reduced in size and in the number of papers used: finally the section is placed in the class that gets standing advertisements twice a week in one or two papers. These standing advertisements still appear in all the places where newspaper work has been started this season; but there are many points we cannot cover with newspaper advertising at all on account of there being no suitable mediums.

5. Post cards and samples of tea have been sent out regularly, the aggregate being about 81,000 pieces. Details are given in another paragraph.

6. The holidays caused a serious interruption in the work, as the retail trade is at that time too busy to consider any new purchases. Practically all houses selling to grocers withdraw their salesmen in the middle of December and resume operations in January, when grocers have taken stock and settled down to regular business.

7. In the foregoing paragraphs I have given an outline of the work done during the last three months, and will now enter into some detail.

8. The period under review included not only the Christmas holidays, but also "Thanksgiving." While the latter is nominally only one day, it is an important holiday in America, and is widely observed as a period of family re-unions. Salesmen usually return to their homes for the occasion, and practically no work is done during that week, the one including the last Thursday in November. With two weeks lost in December and one in November, there were only ten working weeks in the quarter against thirteen weeks in each of the two previous quarters. This loss of 30 per cent. in time is accurately reflected in the number of grocers with whom tea was placed.

9. In the third quarter the specialty men reported 422 sales, aggregating 20,255 lbs. of tea; 17,465 lbs. black (86.2 per cent.) and 2,790 lbs.

green (13'8 per cent.) against, in the second quarter, 610 sales aggregating 37,290 lbs: 20,940 lbs. black (56'15 per cent.) and 16,350 lbs. green (43'85 per cent.)

The close correspondence between the loss of 30 per cent. in working time and the reduction in the number of sales made has already been noted; it supports the belief I have expressed that we can rely upon our system to give uniform results under varying conditions.

10. The relatively larger quantity of black tea sold per head in the quarter under review was not entirely due to the withdrawal of the green tea offer and the concentration of efforts on black tea, but also to another cause.

In the fifth paragraph of my last report I alluded to a plan we were trying experimentally in Colorado, the result of which I proposed to report. Briefly, the arrangement is to allow the salesmen to endeavour to make larger individual sales than we have previously thought prudent: overloading being undesirable for many reasons. Delivery of such sales to be, part immediate, part at intervals of thirty or more days. Advertising by post cards and samples to be based on entire sale.

As the plan here explained worked out quite satisfactorily, it was extended as a part of our regular operations; so that the returns made by the salesmen are appreciably affected by the change.

11. I may here remark that our work is organized for advertising purposes, and that the sale of tea is merely incidental to this; but that is not in itself our object. The adoption of the plan described is, therefore, not due to its placing a larger quantity of tea, although this is effected, but is availed of as widening the scope of our advertising without increasing our standard allowance on the per pound basis; that is already sufficient inducement for grocers to buy according to their capacity. The increased advertising we give is in return for grocers' acceptances for quantities of tea they would not buy were prompt delivery a condition: and although postponement of future deliveries may be asked and given, some even may be cancelled; this is not a drawback. If the grocers' customers after trial do not like the tea, it is not a good policy to force delivery of the extra quantity.

12. While we are not directly concerned with the future deliveries, they now form part of the advertising scheme as a whole, and it is therefore necessary to explain the matter here for future reference. In the regular course these details are attended to by the jobbers we co-operate with. In the meantime the more extensive and intensive advertising given should help to move the tea promptly delivered and thus clear the way for the deferred deliveries.

13. Our operations heretofore have practically all been conducted in conjunction with large jobbing houses whose salesmen visit and sell the retail trade direct. We are now trying a modification of this plan with a jobber of another class. Such a house sells only to smaller jobbing houses established in country towns, who in turn sell to the retail trade through their own staff of salesmen. The large jobbing house of this character employs salesmen who act much in the same capacity as our specialty men. They travel with the salesmen of the local house and keep the special products before the retail trade. There is a division of profits between the two jobbing houses concerned.

14. We tried this method of getting into touch with the retail trade in a section of Kansas where no work had heretofore been done, and have so far found it work quite as smoothly as the other plan; we are, therefore,

giving it a further trial in Texas, where we are now working. I hope to be able to get the salesman who represents the jobbing house to carry on the work on the lines he has seen our own specialty men acting, and thus continue operations in that locality without incurring the expense the deputation of our own men entails upon us. It has to be seen in actual practice whether this plan will work well.

15. We cannot connect directly with local houses as they do not carry India teas in their stocks as yet. We would, therefore, have to instruct them on this point and could not even then rely upon their not substituting other teas when filling orders. The large houses we deal through can be relied on to carry out all agreements.

16. In accordance with the plan followed by the joint fund, we have prepared two new forms of post cards and these have been sent and are still going out to consumers whose names we have secured this season. These are in addition to the first card, which is the only one promised to the grocer buying tea. We are under no compulsion to send these additional cards, as the grocers do not know of their existence till they and their customers begin to receive them. They bring India tea before consumers and grocers periodically, in a direct personal way, over a period of four months or more, including the card mailed in Calcutta. Advertising diffused over a long time is, admittedly, much more efficacious than much more expensive work concentrated within a short period.

17. The new post cards were prepared from miniatures painted on ivory I have long had in my possession. I am afraid that there may be some slight doubt as to their being authentic portraits of the historical personages they are claimed to represent; but I do not think this makes them less valuable for advertising purposes.

18. In consideration of the congested mails during the holiday period, we stopped mailing samples and post cards in the middle of December, to resume in January. During the quarter there were mailed:—

In October	Post Cards	...	...	9,675	Samples	10,850
„ November	„	„	...	19,198	„	12,131
„ December	„	„	...	22,232	„	6,849
				<hr/> 51,105		<hr/> 29,830

in all 80,935 pieces, against 74,796 in the previous quarter.

19. In addition to these, post cards mailed in Calcutta continued to arrive throughout the three months in question; to give a just view of the work done their figures should be added to those given here.

20. The Calcutta post cards prove to be a most effective form of advertising and fully realize my expectations as to the interest they create. They arrive in excellent condition and the Calcutta post mark, which in many cases shows very distinctly, enhances their value in the eyes of the recipient.

21. My last report included figures showing the imports of tea into the United States for the 12 months ending 30th June 1909, and corresponding figures for 1908. The figures for the 10 months of the calendar year are now given.

Contrary to my usual custom of using figures compiled by myself from the Customs House publications, I give them as published by the *American Grocer*, together with the comments; these may carry more weight as coming from an independent source.

Extract from the "American Grocer," dated 12th January 1910.

"Imports of Tea—The imports of tea for ten months ending October, show a marked increase over the same time in previous years. The following statement shows the imports and exports and net imports —

			Pounds.
Imports	...	...	85,041,817
Exports	...	...	1,170,304
Net Imports	...	...	83,871,513
Net Imports 1908	...	...	71,234,684
Increase 10 months	...	...	12,616,829

This shows a gain of about 18 per cent. over 1908. The imports came from the following sources :—

	Pounds.	Per cent. of total.
Japan ...	37,792,684	44.7
China ...	24,372,671	28.3
UNITED KINGDOM—		
British North America, East Indies, etc.,	22,876,462	27.0
TOTAL	85,041,817	100.0

Note the astonishing growth in imports of British-grown tea. A score of years ago China and Japan furnished the supply, but have lost 27 per cent. of the imports."

22. I beg to add my own observations. The figures given here overlap those sent with my last report; for the calendar year includes parts of two separate tea seasons. It is not, therefore, prudent to draw any general deductions from the showing made in a single calendar year.

I am inclined to think that when the figures for the current fiscal year, ending 30th June 1910, are published, they will show a smaller import than last year of both China and Japan teas; the latter includes Formosa Oolong, the crop of which is probably 2 million pounds less than last season. It is anticipated that there will be a shortage of China teas also, both black and green. The probable imports of British grown teas cannot be forecasted in the same way, as supplies are diverted to London when demand here is not active: so far they are probably 50 per cent. less than for the corresponding period last season, when tea was being rushed into the country in anticipation of changes in the tariff.

23. Although New York and the Eastern States are outside of the territory we are working within, the Committee may be interested to learn that tea generally is becoming more popular there. "The New Theatre" in New York, quite recently built, has a tea room for which provision was made by the architects. A New York paper refers to the innovation as "showing the drawing power of the tea-pot." I attach the article in question and may remind the Committee that the allusion to attempts having previously been made to introduce tea to New York theatre audiences unquestionably refers to the season when India and Ceylon jointly had tea booths in six different theatres in New York. The work stopped with the stopping of the India Voluntary Fund. The fashionable tone of one such tea room as is described, will lead to a large number of others being started in New York and another clipping attached refers to a Japanese tea to be given at the opening of the New Café de l'Opera.

The other clippings are of a different character and both are from grocery publications. They both ascribe the increased imports of India and Ceylon tea to our advertising.

24. The furniture House in St. Louis, referred to in the 14th paragraph of the last report, continues to serve India tea to visitors, but there have been no fresh developments since I last dealt with this matter.

(Signed) R. BLECHYNDEN.

CORRESPONDENCE.

Tapping Ceara Rubber in Mysore.

[*Attitude of plantation*—about 3,300 feet.

Average rainfall—90 to 100 inches; chiefly from June to October: occasional showers in April and May, but frequently no rain from October 1st until April following.]

Example I.—Ten of the best grown trees in a 5 acre clearing, 3½ years old and averaging a girth of 13 inches, three feet from the ground, were tapped on alternate days during October and December 1909 and February 1910, i.e., 440 tappings. The aggregate yield of latex was 6,372'25 c.c. (1,795 drachms) which resulted in 4½ lbs. dry rubber.

This is equivalent to 90 lbs. dry rubber per acre of 200 trees for 6 months, or 180 lbs. per annum, tapping on alternate days and alternate months.

Note.—Of the above, one tree proved a poor milker, giving slightly less than half the quantity of latex of the other nine.

Example II.—Five trees in a five year old clearing, averaging a girth of 17 inches, tapped as above, yielded 7,188'75 c.c. (2,025 drachms latex, which gave 5lbs. dry rubber. Equivalent to 200 lbs. dry rubber for the six months, or 400 lbs. per annum, per acre.

Example III.—Five trees, seven years old, girth 26 inches. Tapped as above yielded an aggregate of 12,709'00 c.c. (3,580 drachms) giving 9 lbs. dry rubber.

Equivalent to 720 lbs. dry rubber per acre per annum.

Example IV.—Two trees, ten years old, with girths of 32 inches, gave respectively 900 and 855 drachms of latex, tapped as above, which gave 2½ lbs. and 2½ lbs. dry rubber.

Equivalent to 875 lbs. dry rubber per acre per annum.

Example V.—One fifteen years old tree, having a girth of 43 inches, tapped as above yielded 1,575 drachms latex, giving 4 lbs. dry rubber: equivalent to 1,600 lbs. dry rubber per acre per annum.

The trees appear to have suffered no harm whatever: I intend to tap them again in April, while bare of leaf, and again in June and August, during the S. W. monsoon, and shall be curious to see how the yields compare with those already obtained.

With the cheap and skilful labour in Mysore, it should be possible to place Ceará rubber on the Market at considerably less than can be done from the Straits or Ceylon; however, even taking the cost of cultivation, tapping, etc., at one shilling and rubber at four shillings per lb., *Example II* points to a nett profit of over £50 an acre at 5 years old. (£100 with rubber at its present price). I hope some of your readers in Coorg, where I believe Ceará has been extensively planted of late, will forward some of their results: in any case I am perfectly satisfied in my own mind that Ceará, if taken up seriously, can and will do for Mysore what Pará has done for the Straits Settlements.

"CEARA".

—: o:—

A German consular report, a copy of which has not yet been obtained, deals with the Javanese tea industry, its history and present status, methods of culture and manufacture, and statistics of production and commerce.

SELECTED CUTTINGS.**Some Fungoid Diseases of Garden Plants.**

It is hoped that the following general remarks, on the methods of treating some of the diseases of garden plants, may prove of value to those who are interested in the cultivation of flowering plants, palms, and other ornamental plants.

All fungoid diseases of garden plants may be classified under the three following heads :—

1. Root diseases.
2. Leaf and green stem diseases.
3. Diseases of hard woody stems.

Each of these classes of disease has its own general methods of treatment.

Root Diseases.—The external symptoms of root disease usually bear a close resemblance to those shown when a plant is suffering from drought. If the disease spreads slowly, the lower leaves are seen to wilt, dry up at their edges, and finally fall off; gradually more and more of the leaves fall in this way, until none are left, and the plant is dead. If, however, the disease spreads quickly, the symptoms are somewhat different. One morning it may be observed that all the leaves of the plant look soft and limp, as if had not been watered. On the next day, some of the lower leaves are beginning to dry up, and all of them are considerably wilted; by the next after, the plant is dead. It is a simple matter to determine whether the plant is really suffering from drought or from a root disease; for if the wilting is due to drought, the plant will recover on being watered, but if the roots are diseased, watering will be without effect. On pulling up a plant that had died of a root disease, the roots are often seen to be covered with a fine white web, which is the mycelium, or vegetative portion, of the fungus causing it. The web will spread in the soil from the diseased plant to its healthy neighbours, but there will be no signs of this until the formerly healthy plants are themselves so badly attacked that nothing can be done to save them.

In nearly all the West Indian islands, a particularly destructive root fungus occurs, which destroys Aroids, Antirrhinums, Tomatos and several other plants.

When a root disease is seen to have attacked one plant in a bed, that plant should be immediately taken up and burnt, and the soil round it carefully dressed with lime at the rate of $\frac{1}{2}$ -lb. to the square foot, a little lime should also be sprinkled round the roots of neighbouring plants. If any of these last show signs of disease, they should be at once removed and burnt, and the soil again treated with lime. When a bed becomes thoroughly infected with a root fungus, the safest method of getting rid of the latter is to remove and burn all the plants in the bed, dress the whole bed with lime at the rate of $\frac{1}{2}$ -lb. to the square foot, and allow it to remain empty for about two months before replanting. Even then, it is advisable to put into the bed plants different from those which were growing there before.

If a group of plants in a hedge is seen to have died from the effects of a root trouble, all the plants should be taken up and burnt, and the whole spot surrounded with a trench about 18 inches deep and 2 feet wide. This trench should include one or two healthy plants at either end of the diseased patch. The soil from the trench should be thrown into the diseased area. This area should then be treated with lime as above, and, after six months, fresh plants might be planted.

Leaf and Green Stem Diseases.—These parts of plants are often affected with spots of various kinds, rusts, and mildew, all of which are due to different fungi. Examples of these are: Canna leaf rust, due to a fungus, *Uredo cannae*, which appears as small orange-coloured spots on the leaves; leaf disease of palms, due to *Graphiola phoenicis*, which forms small, black, cylindrical, reproductive bodies on both sides of the leaves; rose and grape-vine mildews, which give the leaves and tips of the branches a silvery white appearance, due to the presence of a white fungus mycelium, which eventually kills the attacked portions, and which may do very considerable damage.

In the case of rusts and leaf spots, and the palm-leaf disease, the plants may be sprayed with a solution of potassium sulphide (liver of sulphur), made by dissolving $\frac{1}{2}$ -lb. of this substance in a quart of hot water, and then making the volume up with water to $2\frac{1}{2}$ gallons. If preferred, a solution of potassium permanganate, or Condy's fluid, may be used as a spray; the solution should be of a light rose colour. Before applying the spray, it would be advisable to remove all badly diseased or drying leaves, and to collect all fallen leaves and burn them.

In the case of mildews, the diseased parts should be cut off and burnt, and all fallen leaves swept up with care and destroyed. The healthy parts of the plants should then be carefully dusted with a mixture of lime and flowers of sulphur. To make this two parts by volume of flowers of sulphur should be mixed with one part of fine, air-slaked lime. The mixture may be applied by shaking it through a coarse muslin bag. It is advisable to do this when the plants are a little wet.

Seedlings that are being grown in boxes are often affected with a disease known as "damping off," especially if the soil in the box is kept too moist. This is due to a fungus which spreads along the surface of the soil and attacks the seedlings at the level of the ground, causing to wilt, fall over, and finally dry up. To prevent this, the dead seedlings should be taken out, and the remainder sprayed with a solution of liver of sulphur, made in the manner described above.

Diseases of Woody Stems.—Many different forms of fungi can attack the bark and wood of plants, forming cankered areas, splits in the bark, hardened, darkened patches in the bark, or decay of the wood. Their fructifications may be of almost any shape and colour: black, red, yellow and brown are the commonest. Often, they look like black crusts or are very minute and require a hand lens before they can be clearly made out. But though the fructifications are often small and inconspicuous, the effects of the disease upon the host plant are, unfortunately, usually only too obvious. The only means of preventing the spread of this form of disease is by removing the diseased portions with a sharp knife, taking care to excise at the same time some of the apparently healthy tissue surrounding them, and afterwards to cover the wounds with tar.—*The Agricultural News.*

The Annual General Meeting of the South Mysore Planters' Association will be held on Monday, March 28, 1910, at the Munzerabad Club, Saklaspur, commencing at noon.

—:o:—

It is stated that a noteworthy feature of the present Pará rubber crop season is an increase in the production of the State of Amazonas, the Acre Territory and Peru and Bolivia, while equally noticeable is a falling off in the production of the State of Pará.

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Scientific Officer's Papers.

XX.—LEGUMINOUS PLANTS.

Virgin soils are always found to contain a high percentage of Nitrogen, and the following abstract from Circular No. 31 of the Bureau of Plant Industry of the United States Department of Agriculture showing how this Nitrogen is accumulated by the wild leguminous plants is reprinted from the *Agricultural News* VIII. 199 :—

"Many hypotheses have been formed to account for the large stores of nitrogen in virgin soils, but none of these have been entirely satisfactory. It seems to be a well established fact that small quantities of ammonia are collected from the air by rain and added to the soil; also, that more or less nitric acid is formed by electrical discharges and added to the supply. Some investigators have attributed the fixation of nitrogen entirely to the latter cause. Recently a number of efforts have been made to show that non-symbiotic, or independent, bacteria are the chief agents in fixing this element. While it seems certain that some nitrogen is added to the soil by each of these methods, it appears to the writer that there is not sufficient evidence to warrant a conclusion that any one of them has been the most important factor in this work. They do not furnish satisfactory explanation of the presence of such large quantities of nitrogen in the soil.

"Several experimenters have suggested that wild legumes may have played some part in this work; they have not generally been considered as important factors. The studies reported in this circular indicate that this subject deserves more thorough investigation than it has yet received, and that native legumes have been of much more importance in this rôle than has been thought.

"Several years ago, the writer raised the question as to whether the native legumes of the prairies were sufficiently numerous to have fixed the amount of nitrogen present. A search for published data on the subject was made, but none were found. Accordingly, in the spring of 1908 a series of investigations was begun, a preliminary report of which is here given.

"The writer had long been familiar with the flora of this region but was not at all prepared for such results as were found. The average numbers of wild leguminous plants per square yard, that were found, were: ordinary ground 17, high plains 3'6, and sand hills 8'4. After the grasses (including sedges) and possibly the composites, legumes form a larger part of our

flora than does any other group of plants. If these figures are representative, or anywhere near it, it is evident that our farm lands from time immemorial have been growing a full stand of legumes. Seventeen plants to the square yard are enough to fill all the soil with their roots. Most of these plants, such as *Amorpha*, *Kuhnistera* and *Psoralea*, have enormous root systems (and these genera represent the large majority of the prairie legumes). A single plant is often sufficient to fill the soil with its roots for a radius of several feet, as any farmer who has ploughed is ready to testify. The smallest root systems are probably those of *Vicia* and *Lotus*, and yet seventeen of these to the square yard would seem to be sufficient to gather a large supply of nitrogen.

"Many examinations were made to ascertain the prevalence of nodules upon different species. Large numbers of tubercles were found on every species examined, and on nearly every individual except mature *Kuhnistera*. Nodules are especially plentiful on *Psorealea*, *Astragalus*, *Acuan*, *Meidomia* and *Lotus*. On *Lotus* the nodules are often almost massed together on the tap-root. Some difficulty was experienced at first in finding tubercles on *Kuhnistera*, but they are always in evidence on seedlings. On the old plants there is a doubt whether typical nodules are produced, or whether the bacteria are in the small, thickened roots which occur in extraordinary numbers, almost in fascicles, especially on roots of the previous year's growth. During the coming season an effort will be made to determine this point. The efficiency of these legumes as nitrogen gatherers does not seem open to question, however, if the universal inoculation of the seedling plants is concerned.

"It does not seem that most of these legumes choose the poorer soils, for, in fact, many of them grow much better on rich soil; but when the soil becomes rich in nitrogen and humus, other plants which do not thrive on poor soil are able to crowd out the legumes. There is good reason to believe that lands that are now richest formerly supported the densest leguminous growths, except, perhaps, where the plant food has been washed down from higher levels.

"Western farmers have been slow to learn their lessons from Nature. Nature on her farm has kept up the production of grasses and other nitrogen robbers by the constant growth of legumes. If this fact had been recognised sooner, perhaps there would not have been such reckless exploitation of the rich soils of the Mississippi basin. For forty years farmers have lost sight of this and have taken off grain crops (all grasses) continuously and doubted if this practice would ever exhaust their soils, because they were still productive after the removal of twenty, thirty, or forty crops. But now the effect is evident: farmers must learn from the prairies round them one of the first principles of permanent agriculture, and introduce leguminous crops into the farm rotation."

These results apply also to Southern India, where a large proportion of the plants in the local flora are leguminous. Here there are leguminous trees and shrubs like *Cassia*, and *Dalbergia*, while there are many species of herbs like *Crotalaria*, *Indigophera*, and *Desmodium*. Undoubtedly these have helped to build up the nitrogen content of the soil, and as pointed out in the article quoted above, although they are now to be found growing wild on poor soil, because they have been crowded out from the good soil by other plants, they will grow much better on good soil such as is to be found in the Coffee and Tea clearings.

RUDOLPH D. ANSTEAD, *Planting Expert.*

Notes and Comments by the Scientific Officer.

18. *Mole Crickets*.—My attention has been called to the following letter to the Editor of the *Malay Mail*, republished in the supplement to the *Times of Ceylon* of 21st February:—

"Dear Sir,—Upon an estate on the alluvial in which I am interested, I find that as soon as my stumps begin to shoot, the shoots are very soon nipped clean off and removed. I have been told that the mole cricket is responsible, and have tried liming, tarring, and even birdlining the stumps in the hopes of driving off or catching some of my enemies. I have had a watch kept at nights, and in fact have done everything in my power to check the pest, but totally without avail so far. I have heard it said that the only thing to be done is to pull up the bitten stumps and supply with young tree stumps 8 feet high. But unfortunately this latter suggestion does not come within the range of practical politics. I have now a gang on digging, with what success I cannot at present say, but if it is the mole cricket, I hope that the demoralising influence of disturbance may effect some good results.

"In the meantime I shall be most grateful for any assistance and advice, and would also be prepared to pay a handsome fee, if required, for a satisfactory remedy for the most serious insect attack which I have known in the course of a very long experience."

I am, etc.,

"MOLE CRICKET"

The Mole Cricket lives in burrows underground and comes out at nights to fly and run about. It burrows along close to the surface, and frequently the course of the burrows is marked by a slight ridge of earth. In these burrows the eggs are laid. The insect feeds on plant roots below ground and at night on the surface on young shoots and tender plants.

A space round young plants attacked should be kept clear of all weeds to reduce the food supply which attracts the cricket, and this space should be frequently stirred to break up the burrows and expose the insect to the attacks of birds.

Baits of chopped Hevea leaves poisoned with Paris Green, or Lead Chromate, may also be distributed about the fields in small quantities near the young rubber plants. The insects poisoned by eating this bait will retire to their burrows to die, so that the effect will only be seen by the cessation of the attack.

Another simple remedy is to water the ground round the plants with soap suds, made by dissolving hard soap in hot water and diluting this solution with cold water at the rate of 1 lb. soap to 15 gallons of water. This brings the insects to the top, when they can be collected and destroyed.

An effective remedy is also to protect the young plants by encircling them with a ring of bark or bamboo, which should be buried in the ground for an inch or two and should project above it, for an inch or two.

19. *Silver Oak Gum*.—It is not uncommon to find Silver Oak trees, *Grevillea robusta*, exuding gum from their stems. This may be due to damage, but in some cases it is the symptom of a disease, gum formation being in all probability due to bacterial infection.

Grevillea gum apparently has no marketable value. It is usually reddish in colour, though I have seen it quite clear, with a brilliant resinous fracture, and its solubility is slight.

RUDOLPH D. ANSTEAD, *Planting Expert*.

INDIAN TEA ASSOCIATION, CALCUTTA.

Extract from the Proceedings of the Twenty-ninth Annual General Meeting of Members of the Association, held on Friday, the 18th February, 1910.

The Chairman presented the Report for the year ended 31st December 1909 and, in doing so, addressed the meeting as follows:—

GENTLEMEN.—I have now the pleasure to present the Report of your General Committee and the Statement of Accounts of the Association for the year 1909. From the Accounts it will be seen that after providing for a contribution of Rs.9,000 to the Scientific Officers' Fund, Revenue shows a deficit of Rs.6,667-13-11 which has been charged to Capital, reducing the sum at credit of that account to Rs.44,646-6-10. It is not proposed to make any increase in the rate of subscription for the current year which as you are aware has remained for many years past at one anna per acre under tea cultivation. Hitherto the increase in the area of tea represented in the Association has enabled us to meet the growing expenditure. But with the advance in our contribution for office expenses to the London Association made in 1906, plus a substantial contribution to the Scientific Officers' Fund, the full incidence of which has for various reasons been deferred till now, it may be necessary in the near future to ask you to pass a resolution increasing the rate of subscription. The area under tea subscribing to our Association is over 390,000 acres, representing about 81 per cent. of the tea grown in the provinces of Bengal and Eastern Bengal and Assam. . . .

The subject of labour is one of perennial interest to our Association. In considering it we have to realise that there are three systems of dealing with it in vogue in the three important districts—Act VI, Act XIII, and entirely free labour. In the Brahmaputra Valley which in area under tea represents 43 per cent. of the total tea area in the two Bengals and Assam is employed a daily average labour force of 283,400. The number of coolies under Act VI in the Valley at 30th June last was 39,253, and allowing for absence on sick leave and other causes it is probable that Act VI coolies furnish about 12 per cent. of the labour employed on the tea gardens in the Brahmaputra Valley. The population on the estates other than those under Act VI is 252,987 adults and 185,716 children. In the various districts of the Brahmaputra Valley the proportion of Act VI labour to the total adult labour force varies considerably, being about 9 per cent. in Sib-sagor with 81,166 acres under tea, 13 per cent. in Lukhimpore with 71,127 acres, and 21 per cent. in Darrung and Nowgong with, respectively, 42,463 and 12,092 acres under tea. In Cachar and Sylhet, representing 28 per cent. of the area under tea in these provinces, the total force employed in 1908 was 140,700. At 30th June last there were only 1,427 coolies under Act VI Agreements, and this Act having been withdrawn from the Surma Valley no fresh contracts under it can be made. The labour other than Act VI labour in the two Valleys is mainly under Act XIII. In the Dooars and Darjeeling, representing in acreage about 28 per cent. of the area under tea, the labour is entirely free. It is evident that with conditions and practice differing so widely as is evidenced by these figures opinion will also differ. It is therefore important that before acquiescing in or asking for further changes in our labour laws a careful survey of the position should be made, and an estimate formed as to whether, for example, the relaxations made in Act VI have been beneficial in attracting labour to the Brahmaputra Valley or detrimental to the interests of the Industry and the labourers employed in it. Much has been made of the large importations of labour into the tea districts during the past two years, and the officers of Government have not failed to attribute this to the fact that most

of the emigrants now go up as free labourers, and to infer from this and from the number of child immigrants that there is much less prejudice against Assam in the recruiting districts than there used to be. I can however assert from personal experience of the movement of free labour to the Dooars that the percentage of children to adults more than doubled in 1908-9 as compared with 1906-7, whereas in the figures commented on in the Resolution on Immigrant Labour into Assam for the year ending 30th June 1909 the ratio is 25 per cent. in 1906-7 and 43 per cent. in 1908-9. I maintain that either in absolute numbers or proportion of children to adults the Brahmaputra Valley figures when compared with the figures of emigration to the Dooars prove nothing but that scarcity conditions prevailed. It will therefore be prudent to reserve judgment and await the results of recruiting in years when famine or scarcity conditions do not obscure the issues before deciding that numbers without regard to their relation are to be accepted as conclusive evidence. Apart from this there can be no doubt of the advantage to the industry which has resulted from the considerable additions to the labour force during the past two years. In like manner it would be useful to enquire whether Act XIII supplies adequate safeguards now that it has to be relied on entirely for all new importations into the Surma Valley and all re-engagements of Act VI labourers in the Brahmaputra Valley. It is, I think, generally allowed that, so far as sanitation and medical care of the labourers are concerned, Act VI with its more stringent provisions enabled much to be accomplished which is impossible or only slowly possible where labour is entirely free. On the other hand I find nowhere in Darjeeling or the Dooars any disposition to depart from the free labour conditions there prevailing. Unfavourable comparisons have been drawn between the free labour and other districts as to sanitation and public health, but it seems to me that before the last word can be said on this question a careful enquiry by competent commissioners throughout all the tea districts is requisite.

I am not attempting to-day to pronounce an opinion on any of the points raised, but I allude to them in the hope that they may stimulate reflection on the whole question before definite opinions are expressed.

One of the difficulties attending the relaxation of Act VI and the varying legal decisions as to Act XIII is the facility which is offered to the enticement of labour. During the past year rules designed to protect employers from this form of loss have been under consideration. The rules have been carefully drafted, they have been the subject of close scrutiny in the Assam and Surma Valley Branches—whose wishes have been met, I think, at practically all points,—and though they may not in their final form satisfy everyone, nor indeed accomplish all that is expected of them, they represent an attempt to deal with a problem of much moment to our industry. They are supported by the General Committee and by the London Association and are now before proprietors there for signature. Copies will be circulated immediately to members of this Association for the same purpose, and I trust that all our members will be prepared to sign the agreements, of which there are two, one for the Brahmaputra Valley and one for the Surma Valley.

Rules with the same object in view were drawn up years ago for the Dooars and have on the whole worked satisfactorily. The secret of success in this attempt to deal by voluntary effort with a difficult question lies, I believe, in the rules being generally adopted. There is no attempt in these rules to interfere with the legitimate freedom of the subject, and their introduction will, I hope, meet with general support. . . .

It must be a gratifying experience to investors to find that after the trying experiences through which the industry passed about 10 years ago,

their confidence in tea has not been misplaced. Though the past season opened on a relatively low level and though the crop at one time promised to be a short one, phenomenal growing weather in the latter part of the season has enabled a record crop to be made in most districts. Drought in South Sylhet and Mosquito Blight in the Terai have unfavourably affected yield in portions of these districts. In spite of an increase of fully 10 million lbs. in the Indian production and as much more in Ceylon prices have advanced and give promise of steadiness. The expansion of markets which has led to this increased crop being absorbed without sacrifice in price will be differently explained; for opinion as to causes is always varied. I am, however, of those who believe that it is in part due to the operations of the advertising campaign which has been for the past few years carried on by growers through the agency of the Tea Cess fund.

As we have Dr. Hope with us to-day I do not think it necessary to anticipate his remarks by saying anything regarding the Scientific Department. The Department has recently been strengthened by the arrival of Mr. P. H. Carpenter, which will enable Dr. Hope to devote more time to touring in the districts than hitherto.

Dr. HOPE said:—Mr. Chairman and Gentlemen,—It is several years since the Chief Officer of Scientific Department has had the privilege of addressing a general meeting of this Association. Since that time changes in the staff of the department have led to temporary reduction in its numbers, but it has recently been brought up to full strength by the arrival of Mr. Carpenter, the present Assistant Scientific Officer, in September last.

The Chemical work of the department has been directed latterly towards the detailed study of the factors which influence the quality of tea leaf, such as climatic conditions, soil, manures, and so on. The results of last year's work in this direction are about to be published, and I will not anticipate the contents of the pamphlet on the subject, except by stating that we have clear evidence that the effect of heavy shade in reducing the quality of leaf, and more particularly the amount of tannin which it contains, is much greater than has previously been imagined, and that we are in possession of data bearing on the effect of the manures in common use on the quality of the leaf.

Experiments in manufacture have also been made during part of last season, and these have been so far confined to a study of the loss of essential oil during the process of firing.

The chemical research work of the department will, for the present, be continued in the same direction, for I am of opinion that useful results will be arrived at by a continuation of the methods we have adopted.

With regard to the Entomological Department, Mr. Antram who, has been granted six months' leave from the middle of April next, has devoted most of the past year to studying the practical methods of dealing with mosquito blight. He has shown that a close connection exists between the proximity of heavy jungle which shades the tea from sun and south-west winds, and the prevalence of mosquito blight, and has completed his study of the life-history of the insect. His suggestions for dealing with the blight will, I think, prove in the majority of cases to be effective in keeping it under control if they are carefully and completely carried out.

I would particularly draw your attention on this occasion to the successful and interesting results of several manuring experiments which have been carried on by managers of gardens in different tea districts during last season. Most of these experiments were made with the object of determining whether chemical manures could compete economically with oilcakes as a tea manure. On the light soil at Heeleaka oilcake was found

to be far superior cost for cost to mixtures of chemical manures. The experiments to which I refer, however, have carried the investigation one step further and have shown that on heavy soils the advantage to be derived from the use of oilcake is comparatively small, but that chemical manures can be applied with marked effect. Where such experiments have been made on light soils, results similar to those which we have obtained at Heeleaka have been recorded. This shows the importance of extending our knowledge of tea manuring by instituting experiments which will indicate the manurial requirements of particular soils and of particular districts, and showing where the results of the Heeleaka experiments are applicable and where they are not so.

There being no further remarks, the CHAIRMAN then proposed the following resolution:—

"That the Proceedings of the General Committee during the "past year be confirmed, the Report adopted and the accounts, "as audited, be passed as correct."

The resolution was carried unanimously.

Extract from Abstract of the Proceedings of the First Meeting on 25th February, 1910 of the General Committee elected for the year 1910—11.

PRESENT,—Sir George Sutherland, Mr. S. G. Anderson, Mr. H. W. Boyd, Mr. H. W. Carr, Mr. W. M. Fraser, Mr. J. Mackenzie, Mr. T. McMorran, Mr. R. R. Toynbee, W. Warrington.

Election of Chairman and Vice-Chairman.—At the unanimous request of the Committee Mr. McMorran agreed to accept office as Chairman, and Mr. Warrington was unanimously elected Vice-Chairman.

Scientific Department Sub-Committee.—It was agreed that the Scientific Department Sub-Committee should consist of the Chairman, the Vice-Chairman and Mr. S. G. Anderson.

Foreign Tea in India.—In the proceedings of the meeting of 11th January last it was mentioned that the Committee were to address the Collector of Customs, Bombay, with a view to ascertaining, if possible, the trade for which the bulk of the tea imported into that province is utilised. A reply dated 18th February from the Collector had now been received. From the particulars given it appeared that during the year 1908-09 the imports of foreign tea into Bombay amounted to 3,597,019 lbs: re-exports being 832,368 lbs., the net imports were 2,764,651 lbs. and this quantity was, it was stated, mainly consumed in Bombay and in parts of the Bombay Presidency. China Black tea ranging from annas 5 to Re.1-4 per lb. was used by Indians who preferred that tea to Indian tea as being cheaper and who had acquired a taste for it. The cheap qualities of dust were mostly utilised by the Mahomedan, Hindu and Parsce tea shop-keepers who wanted a cheap coloured decoction. A list of the principal merchants of the port was attached.

The Committee noted with some surprise the information to the effect that China tea of such a high value as Re.1-4 per lb. was used among other reasons on the ground that it was cheaper than Indian tea. The Collector was to be thanked for his letter, and it was agreed to forward a copy of it to the Indian Tea Cess Committee for their information, and with a view to their investigating whether anything could be done in the way of placing Indian teas on the Bombay market.

Deforestation in the Darjeeling District.—Reference was made, in the Preliminary Report for 1909, to a committee of investigation to

be appointed by the Government of Bengal to report on the district of Darjeeling as a whole in regard to deforestation. With a letter of 17th February Mr. G. W. Christison forwarded for the information of the Committee a correspondence he had had with the Deputy Commissioner. From this it appeared that His Honour the Lieutenant-Governor considered that the examination should be confined to a definite part of the District. The Balasun Valley had already been inspected, as mentioned in the Preliminary Report, but it was not regarded as a typical district, and His Honour suggested that a suitable field for observation might be found in the North West corner of the district in the valleys of the little Rangeet, the Rangun and the Raman. And it had been arranged that the enquiry should be limited to that district, the Committee consisting of Messrs. J. W. A. Grieve, Deputy Conservator of Forests, G. W. Christison, John Stolke and Paul Moller.

Mr. Christison was to be thanked for forwarding the papers.

Scientific Department. (a) *Heeleaka Experimental Station.*—

In connection with the proposal recently under consideration, that, in view of the difficulties experienced by the Scientific officers in obtaining an adequate supply of labour at Heeleaka, the experimental station of the department should be changed, a letter of 20th February from Dr. Hope was read. It forwarded a copy of the minutes of meeting of the Heeleaka Advisory Committee held on the 5th February. The matter had then been discussed and a resolution adopted to the effect that the Advisory Committee considered it would be undesirable to continue the garden work at Heeleaka any longer owing to the impossibility of carrying out the work satisfactorily there. With regard to this resolution Dr. Hope enquired whether arrangements might be made to hand over the Garden area at Heeleaka at once to the Scottish Assam Tea Company, from whom the land is held. This would take out of the hands of Mr. Carpenter, the Assistant Scientific Officer, work which the Advisory Committee considered would not be productive of further results of value and would give him more time to arrange for other experiments.

It was agreed to postpone consideration of this question until an opportunity had been had of consulting Dr. Hope further in regard to it.

Recruiting.—The Committee unanimously agreed to take up the question of the opening out of the Madras Agency tracts to recruiting, and it was arranged to approach the Government of Bengal with regard to this matter. The local Branches were also to be asked to write the Government of Eastern Bengal and Assam with a view to strong representations being forwarded to the Government of India asking them to take the matter up with the Government of Madras.

Mr. R. D. Anstead returned from South Mysore yesterday, and will report in a later issue upon the work he did there.

No date has yet been fixed for his tour in Central Travancore, but there is every prospect that he will start on this about the end of the current month.

It may be mentioned that Mr. Anstead travelled to Mudigere in company with Mr. Bernard, of Messrs. Parry & Co., Madras, the Managing Agents of the Presidency Manure Works, Ltd. The Scientific Officer took the opportunity of discussing with that gentleman the needs of the planters with special reference to local conditions, such as freight, transport, composition of soils, &c. Obviously it would be of great benefit to planters if importers and manufacturers of fertilizers would work in consultation with the Scientific Officer to the U. P. A., S. I.

CORRESPONDENCE.

Crotalaria Striata.

QUARD HITLOW,

Koppha, 1-3-10.

I have been experimenting with *Crotalaria Striata* for some years and will give you my experience so far with pleasure.

I got some seed in 1907, and part of this I had put in a nursery in May and planted them out in September.

The bit of land I planted it in had gone completely out with stump rot some years ago, and had been planted up with young plants but with no success at all; they dwindled and died. The *crotalaria* was left in this little bit of land from September 1908 to August 1909 and it was then dug out and planted up with Coffee plants and these are *so far* thriving quite well *without* any special treatment. Now I am going to give them a mulch of dead leaves—and I will let you know how they thrive later.

I am going to experiment on a very large scale this year with *Crotalaria* and am *hoping* great things of it. I am also making big nurseries of *Erythrina lithosperma*.

I find it is not a good plan to broadcast *crotalaria*, as it will not do in June on account of too much rain, and September is too late as it doesn't get enough growth before the dry weather. The best plan is to make a nursery early in May and plant out in the estate 2 ft. apart in August and in that way get it 6 ft. high.

(Signed) W. MAXWELL MAYNARD.

Scientific Officer's paper XVII (page 54)

ABIAL ESTATE, MERCARA,

March 7th 1910.

I note in the issue of the "*Planters' Chronicle*" of the 19th February "Scientific Officer's paper XVII 'Phosphatic Fertilisers' "that Basic or Thomas' slag should never be mixed with sulphate of ammonia or any nitrogenous manure."

Does this apply to Saltpetre or other nitrates? A mixture of 4 parts Basic slag to 1 part of refined saltpetre appears to be the simplest form of a complete manure, presenting the 3 chief constituents of plant food in very nearly perfect proportions and making the cost of application very cheap if applied mixed.

(Signed) G. K. MARTIN.

[*Note by the Scientific Officer :*

Saltpetre and other nitrates are "nitrogenous manures", and as such should not be mixed with Basic Slag. This warning about Basic Slag applies most of all to mixture with artificial manures, and it does not matter so much if it is mixed with nitrogenous manures like cattle manure, poonac, &c., though it is better to avoid the small loss of nitrogen which is apt to occur.

The complete fertiliser mentioned in this correspondent's letter should be applied in two lots, the basic slag before the monsoon and the saltpetre after the monsoon.

Saltpetre should always be applied after the monsoon. It is very soluble and is in consequence apt to be washed out by heavy rain and lost.
—R. D. A.]

TEA.**A Lecture.**

On the opening day (February 3, 1910) of the fourth biennial Midland Counties Grocers' and Allied Trades Exhibition at Birmingham, Mr. H. Rose, of the Mazawattee Tea Company, delivered a lecture upon "Tea: A Short Account of its History, Growth and Manufacture."

The historical portion contained nothing new, and the description of methods of cultivation and manufacture need not be quoted here. Mr. Rose spoke of some other details, however. For instance, as to the "Tannin Bogey" he said that, with regard to China tea, that bogey was there in the shape of a difference of '80 per cent. only in favour of China tea, as against Ceylon, and 2'25 per cent. only as against Indian. This was the result of the analysis of the three teas, weight for weight, and his hearers, as practical men, knew well enough that twice as good an infusion could be obtained from Indian or Ceylon teas as from Chinese. H. M. Board of Customs had stated that 1 lb. of Chinese tea produced 5 gallons of tea of a certain depth of colour and fulness of flavour; 1 lb. of Indian tea would produce 7½ gallons of a similar beverage. If they granted this, they would, like true Imperialists, educate the public to drink the finest tea of British growth, for, of course, he was not comparing China tea with coarse, low-grade teas, which were bad for the digestion, and also for the reputation of the men who sold them. He urged upon the members of the trade who were present, and also the public, the advantages of fine teas. To the trader they were more satisfactory in every way, for they brought more business, and added to his reputation for quality. To the public the added cost was trifling, but the added enjoyment and advantage to health were enormous. If managers and assistants were instructed to keep fine teas well to the front, and were provided with arguments to use when talking to customers, it would be found that 2s. 6d. tea was by no means a thing of the past. But the effort must be backed up with quality and value. If this were done systematically, increased trade and increased profits will result. Numbers of men were adopting this policy, to the advantage of the public and their own tea trade.

Tea, he said, was playing an important part in the prosperity of India and Ceylon, and we must view with satisfaction the clearing of thousands of acres of waste lands for the cultivation of tea—the employment of many thousands of people, and the building up of so great an industry within this empire. In addition to this, tea provided our Exchequer with upwards of £6,000,000 a year.

It had been said that 80,000,000 cups were consumed daily in Great Britain, but he should say it was probably more. How important it was, then, to see that the public were educated to drink the right quality. The trade could do great things in this direction, and he urged his hearers to use every means in their power to develop the sale of high-priced teas. He had said the trade had undergone many changes; and the greatest had been in the methods of distribution. The tendency of late had been to push and advertise low priced teas, and if this tendency was not met by grocers doing their utmost to counteract it, the public would soon get the idea that tea at 1s. 4d. was the best obtainable. Let them not be afraid of the 2s., 2s. 6d., and 3s. tickets. Keep these prices under the eye of the public. He believed they had a better opportunity to-day than ever. They did not find the tailor give up the idea of guinea trousers because others advertised them at 10s. 6d., neither did the hatter give up the idea of 10s. 6d. and 21s. hats because people advertised hats at 2s. 11d. United and persistent efforts on the part of the trade and the associations could do great things

COFFEE.**Coffee in Brazil.**

Among lectures delivered at the fourth biennial Midland Counties Grocers' and Allied Trades' Exhibition which opened at Birmingham on the 3rd ultimo was one by Lieut. Col. Edmund Wright, state delegate to the Government of San Paulo.

Inter alia Col. Wright said he thought it was a pity that more coffee was not consumed in England than at the present time. He gathered that the consumption in the U. K. was smaller than in most countries. In fact, in some other lands there was quite six times more coffee used than in England, where only $\frac{1}{2}$ -lb. per head of the population per annum was consumed. Twenty years ago more coffee was drunk than to-day, but he was pleased to say that the consumption had increased somewhat during the last year or so. It seemed to him that people had an idea that tea was better than coffee, but if they could only be persuaded to try coffee which had been properly made he thought they would discover their mistake. He advised his hearers to take coffee and tea on alternate days for a few months, and if that were done he had no doubt they would come to like coffee better and would drink it more regularly than at the present time. As a beverage coffee could not be excelled, especially for breakfast.

Lieut.-Col. Wright first dealt with the discovery of coffee by the Arabs, and then said that most of the coffee consumed in the world came from San Paulo. According to the latest statistics there were in San Paulo 56,931 coffee plantations or "fazendas," with a total of 688,845,000 coffee trees. The total value of coffee plantations in the State was estimated at £65,739,000. Last year, or rather from July, 1908, to July, 1909, Brazil produced 13,036,586 bags of coffee, whilst all the other coffee-producing countries together only produced 4,003,000 bags. Thus Brazil produced more than two-thirds of the world's coffee. Last year the consumption of coffee in the United Kingdom was 270,813 cwts., of which only 48,348 cwts. was Brazilian coffee. So that, taking into account the consumption of the United Kingdom, there was relatively very little Brazilian coffee used there in comparison with coffee from other countries. There was no reason why this should be so, because Brazilian coffee was just as good as any other, and could be got at much lower prices, at the present time especially. And why? In consequence of the over-production in S. Paulo.

In Brazil a coffee plantation was in the majority of cases started on virgin soil and on elevated ground. The virgin forest, with its gigantic trees, was cut down and the seed was planted.

Speaking of "Fazenda" coffee, the lecturer said that it came direct and untouched from the plantations in S. Paulo. The Government of that State, desirous of extending the sale of the staple product of the land, had appointed him a delegate to live in England and to supervise the business of popularising S. Paulo coffee. "Fazenda" coffee was roasted and packed in London under his personal supervision, and each hermetically sealed tin carried the S. Paulo Government seal and guarantee of purity.

All this makes it no purer, however, than the unguaranteed Coffees of India: and the Brazilian Government do not, and cannot, guarantee delicacy of aroma and flavour.

Extracts from the lecture are given for the purpose of showing how "Fazenda" Coffee is being forced under the notice of the people of the United Kingdom. The tactics adopted can scarcely fail to be successful, whether the Coffee itself is really good or not, unless the people interested in coffees grown in other lands resort to similarly vigorous measures of propaganda.

SELECTED CUTTINGS.

Nitrogen as a Fertiliser.

This important element is essential to plant life, and, while it is abundant in the elementary form, it is, nevertheless, the most costly material which enters into the composition of commercial fertilisers. The high cost is due to the fact that ordinary plants can utilise nitrogen, only when it is in combination with other elements, and there is no economical process known by which the nitrogen of the air can be combined directly with other elements. Fortunately we have the means of obtaining nitrogen, by an indirect method, from the atmosphere, of which this element constitutes about 78 per cent. This may be accomplished through the agency of bacteria. These are found in the soil, and under proper conditions multiply with amazing rapidity. They develop only on the roots of leguminous plants, such as clover, cowpea, vetch, velvet bean, &c. Here they make use of the nitrogen of the air, absorbed by the soil, and convert it into compounds which are taken up by the plant. On the roots of the plants are produced nodules that are frequently very numerous and variable in size. This method of restoring nitrogen to our soils is becoming more generally appreciated as it furnishes this element at the least possible cost.

The effect of nitrogen on a plant is very marked. It promotes a rapid growth of leaf and stem, and tends to produce a large, green, succulent plant. While a plant is in this condition, with a large supply of available nitrogen present in the soil, the formation of buds and flowers is retarded, and the flowers are not only diminished in numbers but many of them are rendered sterile, so that they produce no seed. A plant which grows up with an abundant supply of nitrogen is also less capable of withstanding a drought, and begins to burn when the moisture supply becomes limited.

Nitrogen does not merely act as a stimulating agent to the plant but enters into composition with the plant, forming albuminoid and other nitrogenous compounds. Plants grown on a soil well supplied with nitrogen are much richer in the above compounds than those grown on poor soil.

It is highly probable that nitrogen must be in the form of a nitrate before a plant can make use of it. In the soil there are a great variety of micro-organisms, and some of these have the power of converting various substances, containing nitrogen, into nitrates, so that most nitrogenous compounds when applied to the soil are acted upon by these bacteria, and, through this vital agency, are converted into nitrates. For the nitrogen of fertilisers we are dependent upon sodium nitrate, sulphate of ammonia, or various organic compounds, such as blood, bone, cotton seed meal, tankage, fish scrap, &c. It will now appear that the source from which the nitrogen of a fertiliser is derived is a matter of great importance. If nitrate of soda is used all the nitrogen is immediately available. If sulphate of ammonia is used it may become rapidly available on certain soils, slowly available on others, and on still others it may exist in an unavailable form so long as to be useless to the crop for which it was applied. In the case of the organic substances we find the nitrogen of some much more readily converted into nitrates than that of others. Much depends upon the nature of the soil and on the kind of bacteria present. We are just beginning to appreciate the importance of the action of these bacteria, and we may expect far reaching results from investigations along this line.—H. K. Miller, in "Press Bulletin" 22.

The Planters' Chronicle.

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MARCH 19, 1910.

[PRICE AS. 4.

THE U. P. A. S. I.

(INCORPORATED.)

Rubber in Wynaad.

In Proceedings of the Wynaad Planters' Association published on another page exception is taken to a remark in Sc. O. Paper No. XII (monthly issue, January 1910, p. 354).

Upon a reference being made to Mr. Anstead that gentleman wrote:—

“I note that Mr. R. K. Walker, Director, East India Tea and Produce Co., Ltd., took exception to the statement I made that the Wynaad appeared to me to be unsuitable for Rubber. I alluded in that statement to Pará Rubber only, but unfortunately the word ‘Pará’ was omitted. I quite agree with Mr. Walker that the district appears to be excellently suited to Ceará Rubber and that the Ceará at present in cultivation is doing very well and should be extended. All the Pará I had the opportunity of seeing, however, was not promising and was growing slowly. I am only too glad to hear that Mr. Walker has had success with Pará, and should be delighted to find that my first impressions were wrong.”

Bonus on Green Tea.

The opinion of Councillors of the U. P. A. S. I., has been invited with reference to a letter, dated the 13th instant, from the Hon. Secretary, Wynaad P. A., which reads as follows:—

“At a Meeting of this Association held on 9th instant it was decided to ask the Indian Tea Cess Committee through the U.P.A.S.I., to renew the bonus on green tea exported from this country.

“I see in the report of the Indian Tea Association of London (*Planters' Chronicle*, Nov. 1909), that Mr. Blechynden, who had induced several grocers in the U.S.A. to push Indian green tea, found it was impossible for them to obtain repeat orders, so that they had to fall back again on China and Japan green tea; and that he considered that unless he could reckon on a steady supply of this class of tea being sent to the United States for several years it would be better for him to drop green teas altogether and confine the whole of his efforts to pushing black teas. But the quantity of green tea exported continued to decrease, and the Cess Committee abolished the bonus.

“It is now believed that there are excellent prospects of successfully developing the industry in South India, from which little or no green tea has hitherto been sent and Messrs. Harrison and Crosfield, Ltd., of Colombo, have decided to open a market and build a green tea finishing factory in Quilon. Tea in South India practically goes on flushing all the year round;

so the conditions are much the same as in Ceylon, where the manufacture of green tea is carried on successfully and on a large scale.

"It may be objected to the proposal put forward by this Association, that the market for common teas is so good at present, that few planters in South India would be likely to take up green tea. But I understand that Messrs. Harrison and Crosfield have already been promised a large amount of support; in fact if they start the business it will be on a scale worth the attention of the Cess Committee.

"As all the tea they export will be finished and graded in their own factory the trouble of examining a number of samples of small invoices from various Estates will be avoided."

An Inquiry.

Can any planter kindly state the botanical name of the leguminous plant known in Canarese as *chakte sappu*?

Potatoes on the Nilgiris.

In Vol. V, No. 6 (February 26, 1910—pp. 66/67) an extract was given from a report by Mr. George Oakes on the cultivation of Potatoes on the Nilgiris from Australian Seed supplied by the Collector of Nilgiris.

The Collector, when sending Mr. Oakes's report on to Government, stated that the seed cost about Rs.16-9-10 per cwt. or Rs.3-10-4 per maund of 25 lbs. and arrived in excellent condition. Elsewhere he referred to this price as "more than ryots would care to pay."

He remarked, further: "The 'Satisfaction' occupied 70 cents of land, the 'Brownell's Beauty' 29 cents and the 'Cambridge kidney' 32 cents, or a total of 1'31 acres. Mr. Oakes's expenses of cultivation were much heavier than usual, as he had to break up virgin land. It will be seen that the crop is quite free from disease and satisfactory in all ways except that, owing partly to the land being only of medium quality and the rainfall defective and partly to the seed being new to the climate, the outturn is considerably smaller than was anticipated. The rate of outturn will probably improve considerably in the second year of growing the seed, which will now be acclimatized.

"Mr. Oakes intends to sell part of his half of the crop to the public for seed and to sow again the remainder in his own land. I am also giving the Curator of the Government Gardens some of the seed to be planted in the Gardens. There will thus be available to the public at the end of the next potato season a further supply of untainted, and also acclimatized seed. The remainder will now be sold to cultivators specially selected for their intelligence by the Tahsildar of Coonoor and the Deputy Tahsildar of Ootacamund, and it is being arranged with them that they shall sow it in land which is believed to be free from the taint of the Irish blight and that they shall keep the resulting crop for seed purposes, and not sell it all to the Rowthar potato-dealers. With each lot of seed, a Tamil leaflet is being issued which insists upon the above two points and gives general instructions regarding the best methods of cultivation and information as to the way the spread of the Irish blight may be restricted.

"The experiment has aroused much interest in the district and far more applications for the seed have been received than can possibly be complied with. Even if the experiment eventually does no other permanent good (owing to cultivators allowing this seed to pass out of their hands, or get diseased, after a few years) it will at least have drawn attention to a simple method of obtaining seed potatoes free from disease and to the benefits derived from growing them in untainted land."

The report from which these extracts are taken was recorded by Government with the remark that their thanks were due to Mr. G. Oakes for the assistance he had kindly given in the carrying out of the experiment.

The International Rubber and Allied Trades Exhibition.

The following is extracted from the Advance Prospectus of the above Exhibition, which is to be held at the Royal Agricultural Hall, London, 12th to 28th June, 1911, (15 days) :—

"It is with pleasure the directors announce the exact date and location of the next Exhibition. It will be held in that fully equipped building, with its spacious club, lecture and dining rooms, *viz* :—The Royal Agricultural Hall, Islington, situated almost on the borders of the City of London and one of the most get-at-able buildings, served as it is with a constant stream of electric cars from all parts of London, also tubes from the City and West End, and is close to the leading railways. The building has every possible convenience for exhibitors, is lit by electric light and has a plentiful supply of electric power, gas, &c., for machinery.

"The management are again making arrangements for the holding of conferences and the delivery of lectures and addresses on 'Rubber: its uses, &c.' and other cognate subjects. It is hoped that producers as well as the trade generally, from all parts of the world, will attend such lectures, and, by taking part in the discussions, contribute to the general knowledge of the various matters dealt with, and these discussions will be published after the close of the exhibition.

"*Exhibits.*—A classification list of exhibits will be found in this booklet, and while not being a fully detailed list, the headings cover everything connected with Rubber, and materials or articles necessary to procure preserve or assist in the production of the manufactured article.

"A display of the kind suggested is quite certain to embrace an extraordinary variety of specialties. The evolution of the almost numberless articles, wholly or in part made of Rubber, from the raw material, will constitute a source of interest not hitherto enjoyed by the public. Rubber producers in various quarters of the globe are taking a keen interest in the Exhibition, and have intimated their intention to co-operate with the management in every possible way, and this interest is equalled by that of Consuls and others on this side, who, by joining the committee and in other ways, are assisting the executive to secure a thoroughly representative and interesting display of Rubber of every known description.

"This Prospectus is necessarily incomplete, being issued as it is nearly eighteen months previous to the opening of the Exhibition.

"The management have to thank the many Governments, producers, rubber and machinery manufacturers, &c., for their kind promises to take part in the Exhibition.

"Arrangements will be made for a special view on the evening of the 10th June, in order that exhibitors may be enabled to furnish particulars of their several exhibits to the representatives of the Press of England and other parts of the world.

"*Attendances.*—The management will issue many thousands of tickets of invitation to the opening and on other days during the Exhibition, and exhibitors have a special privilege of issuing invitation tickets to those likely to be interested in their goods, upon the following terms and conditions :—

'The exhibitor may print in any style and size he likes, with whatever matter he wishes on the reverse side, and submit a sample ticket to the management. These tickets are collected at the gate and the exhibitor agrees to redeem them, as presented, at the rate of 25/ per 100. To secure this concession a guarantee must be given that at least 100 will be presented.

Thus an exhibitor may issue 1,000 tickets and only 400 would be presented, and for that number only he would be charged.'

"The rate for space for exhibits in all sections, departments or portions (the management consider one position as good as another) is 4/ per sq. foot. Many exhibitors consider certain positions as specially good and if they wish to secure then they should apply for them at once. Plans and applications for space may be obtained on application to the management.

"Exhibits may be sent in on or after 6 a.m. 1st June, 1911.

"The Exhibition will be opened at 12 noon on Monday, 12th June, and thence daily from 11 a.m. to 10 p.m.

CLASSIFICATION.

Plantation Rubber of every description.

Crude Plantation Rubber.

Block, Sheet, Biscuit, Crêpe, Worms, Lace, Scrap, &c.

Wild Rubbers.

Rubbers from Brazil, Peru, Bolivia, Colombo, Guianas, Mexico, Assam, Borneo, &c., &c.,

Balata, Gutta Percha and Tropical gums generally.

Botanical Specimens.

Methods of Tapping.

Tapping Knives.

Collecting and Coagulating Utensils.

Machinery of every description required for the preparation of Rubber (Wild or Plantation).

Machinery, &c., required on Rubber Plantations.

Fertilizers.

General Rubber Estate Sundries.

Motor and other Boats, Motors and other Vehicles used on Rubber Estates.

Articles not enumerated.

Manufacturers' Section—

All Goods manufactured wholly or partly of India Rubber, Gutta Percha, Balata, and Asbestos.

Chemicals, Fillings, &c., used by India Rubber Manufacturers.

Fabrics used in the manufacture of Rubber Goods.

Machinery, Moulds, Utensils, &c.

Rubber Substitutes, Reclaimed Rubber, &c.

Vulcanite and Ebonite.

Asbestos Goods—

Articles not enumerated.

Rubber Literature—

The Committee of the Planters' Association of Ceylon has passed a resolution declaring that it will be pleased to give its patronage to the proposed International Rubber Exhibition, 1911.

—:o:—

Regarding the suggested appointment of a chemical expert for the Ceylon rubber industry, the Committee of the Planters' Association of Ceylon has resolved:—"That, before coming to a decision on this subject, Mr. Kelway Bamber's views be ascertained and further action left in the hands of the Chairman, Planters' Association."

Scientific Officer's Papers.**XXI—RUBBER AND CLEAN WEEDING.**

The following extract from a recent Circular issued by the Director of Agriculture, Nyasaland, is reprinted from the *Agricultural News*:—

"It has been proved that the flow of latex from a rubber tree is affected by endosmotic pressure, which practically means the amount of water in the plant roots. It is the practice to tap rubber in the early morning and evening, and to discontinue during the heat of midday and early afternoon. During the heat of the day much water is evaporated by the leaves, and latex flows slowly, but in the early morning and evening water wishes to enter by the root quicker than it is evaporated, with the result that there is an internal pressure which helps the flow of latex; therefore it is practical to assume that there is an intimate connexion between the presence of water in the surface soil surrounding the roots, and the flow of latex from the rubber tree. For half the year in Nyasaland there is no rain, and daily the sun is strong enough to evaporate water from the plants and from the soil. The question arises, where does this water come from? The answer is, from the lower layers or subsoil, by the rising to the surface in the form of water vapour and water liquid (capillarity). In the surface soil of a clean-weeded estate the water during the day is principally in the form of water vapour, the water being vaporized to a considerable depth by the direct, overhead rays of the tropical sun. In the surface soil of an estate growing a green manure crop, there is a large proportion of the water in the liquid form, as the covering of vegetation reduces the temperature of the surface soil, and prevents the direct penetration of the sun's rays. Therefore, when rubber is growing surrounded with vegetation, its roots have actual access to liquid water through the greater part of the day. If we examine the same soils during the dry season after the green manure crop is dead, we still find more moisture in the latter, as the dead remains of the green manure crop absorb and retain water more firmly than ordinary soil, but deliver it freely to the rubber roots, although not as freely as to the atmosphere."

During my recent tour in S. Travancore, I conducted an experiment upon one estate which I visited which exactly bears out the above statement. Two samples of soil were taken, one from under a very poor covering of *Passiflora*, and one from a patch which had been kept clean weeded and exposed day by day to the baking sun. Equal weights of these samples were dried in an oven for five or six hours and then reweighed. The result showed that the soil under the *Passiflora*, though this was of poor growth and gave a minimum of shade, contained 11% more moisture than that on the clean weeded area, which represents a large amount of water.

This experiment is a strong argument in favour of keeping the ground covered with a growing cover crop even during the dry season. A 3 or 4 foot circle round each tree should be clean weeded and kept covered by a mulch, and the rest of the land should be covered by a growing crop of *Passiflora*, or better still of a leguminous weed like *Cassia mimosoides*.

The disadvantage of having the whole soil covered with a dead mulch is the great danger that is run of fire, especially when the estate is surrounded, as it was in this particular instance, by jungle in which fires are constantly occurring.

A system of clean weeding which leaves the soil exposed during the dry season to the wind and sun, results in an enormous loss of moisture, far more than is taken out of the soil by a growing cover crop, and this loss, as the above extract shows, it is important to check.

Apart from this, when the heavy rains of the monsoon period come, the loss of surface soil from wash is very large, and each year this valuable surface tilth is carried away, and the soil is constantly being denuded and impoverished. A cover crop breaks the force of the rain and prevents this wash.

Paddy fields in boundary with some clean weeded estates which receive the wash from the latter, are giving increased crops due to the fine surface soil from the estates which is deposited upon them; a fact which speaks for itself.

RUDOLPH D. ANSTEAD, *Planting Expert.*

Notes and Comments by the Scientific Officer.

20. *Soil Analyses*.—Enquiries are often made about soil analyses and where they can be made. For the present, at any rate, it is impossible for me to undertake the analysis of soils; this work takes a considerable amount of time which cannot be spared under the existing conditions. The best plan is to send samples of soil to be analysed by private analytical chemists and pay their fees. In the *Planters' Chronicle* for November 1909 a list of the fees charged by Bangalore chemists was given, and these will serve as a useful guide. The analysis really required is that marked D, though of course the analysis E is of interest.

Instructions for taking samples of soils for analysis have been published in the *Planters' Chronicle* (Sc. O. Papers XI).

When analyses have been obtained, if planters care to send them to me, I shall be very glad to interpret them and advise as to manurial treatment.

21. *Castilloa Rubber*.—On many estates in Southern India *Castilloa* rubber grows rapidly and well, but when it comes to tapping a difficulty is encountered; the latex will not run, and rapidly coagulates in the cuts, and in consequence scrap rubber only is obtained.

A correspondent writing in the December number of the *Journal of the Jamaica Agricultural Society* throws some light upon this. He says, speaking of different varieties of *Castilloa* :—

“The Black Bark—so called—has a smooth, mottled grey bark in exposed situations, but when protected by other trees, the shade of grey gets darker. The bark is half the thickness of the other variety, about quarter of an inch to half an inch according to age. The leaves are larger and coarser. When tapped, the latex trickles in small quantities for a short time, then coagulates in the wound, consequently most of the rubber is found in the cuts, and very little reaches the vessels set to catch it.

The Yellow Bark has a rough, dirty brown bark, about one inch in thickness. The leaves are smaller and thinner than the Black Bark variety. When tapped it bleeds freely, the latex running down in perfect rivulets, with only a thin layer remaining in the cuts.

“The dry rubber is somewhat darker in appearance than that of the first mentioned variety. The above are about the only distinguishing marks of the varieties, and they were pointed out to me by an old rubber gatherer, who in his 35 years in the business has tapped rubber from Ecuador to Mexico, and who, therefore, is something of an authority.”

Despite this it is quite possible that the difficulty may be overcome and the latex made to run by the use of some solution. This is a problem to which I shall hope to be able to give particular attention at an early date.

RUDOLPH D. ANSTEAD, *Planting Expert.*

DISTRICT PLANTERS' ASSOCIATIONS.**Shevaroy Planters' Association.**

Proceedings of a Quarterly General Meeting held at the Victoria Rooms, Yercaud, on Monday, 7th instant.

PRESENT :—Messrs. S. Campbell, J. C. Cobbs, B. Cayley, E. Dickins, R. A. Gilbey, W. Hight, H. B. Kundaswamy, J. C. Large, E. Large, W. I. Lechler, C. G. Lechler, T. Manuel, C. Rahm, W. Rahm, Father Rochet, B. Short, and Chas. Dickins, (Honorary Secretary and Chairman).

VISITOR :—Mr. Hardy Lee.

1. The notice calling the meeting was read.

2. *Honorary Member*.—The Honorary Secretary informed the meeting that Mr. R. D. Anstead, the Sc. O., had been unanimously elected Honorary Member of this Association at the last Committee Meeting.

3. *Finance*.—The present income of the S. P. A. being insufficient to carry on its business, it was found to be absolutely essential that increased funds be provided.

After considerable discussion it was proposed by Mr. C. G. Lechler and seconded by Mr. B. Cayley :

That the present subscription of Rs.12 per annum be maintained for a cultivated holding up to 120 acres and a further subscription be charged of one Rupee for every ten acres above this 120 acres ; also that at all General Meetings one vote be allowed for every Rs.5 subscription.

Amendment—

Proposed by Mr. B. Short and seconded by Mr. J. C. Cobbe.

That the present subscription of Rs.12 per annum be raised to Rs.15 per annum and the voting power remain as at present.

The amendment was put to the vote and carried.

4. *Scientific Officer*.—Read letter No. 9/10 dated 2nd March from Secretary U.P.A.S.I. *re* : proposed trip of the Sc. O. to Ceylon.

Resolved that the Honorary Secretary inform the Secretary, U.P.A.S.I., that the Funds of this Association do not permit its subscribing towards the expenses of the trip.

Special Constables for patrolling Estates during Crop.—Read letter from Mr. W. Hight complaining that the Special Constables deputed to visit his Estate has been called away on other duty.

Resolved that the Honorary Secretary write to the Superintendent of Police, Salem, bringing the above complaint to his notice and ascertaining if the Constables were ordered on other duty with his sanction.

The Planters' Benevolent Fund.—Read letter No. 4/10 dated 28th February from Secretary, U.P.A.S.I., *re* : the Planters' Benevolent Fund.

Resolved that the Fund be started at once and the list circulated amongst all Planters on the Hills. Rs.160 was collected on the spot.

7. *Delayed Mails to Yercaud and Nagalur*.—Read and recorded P. M. General's letter dated 28th December, 1909.

8. *Grass Permits*.—Read and recorded letter dated 3rd February, 1910 from T. P. Peak, Esq., D. F. O., South Salem.

9. *Read and Recorded* the following Circulars from Secretary U. P. A. S. I:—

97/09	...	...	..	dated	6th December 1909.
98/09	...	...	...	..	8th "
99/09	...	...	...	..	11th "
101/09	...	...	...	..	20th "
102/09	...	...	...	..	23rd "
103/09	...	...	...	..	24th "
104/09	...	...	...	..	29th "
1/10	...	...	...	..	3rd Jan. 1910.
2/10	...	...	...	..	3rd "
3/10	...	...	...	..	10th "
4/10	...	...	...	..	11th "
5/10	...	...	...	..	29th "
6/10	...	...	...	..	28th February 1910.
8/10	...	...	...	..	2nd March 1910.

10. *Papers on the Table*.—Various Tea Circulars, *Planters' Chronicle*, Madras Agricultural Calendar, 1910, Report of the operations of the Department of Agriculture 1908—1909.

11. With a vote of thanks to the Chair the meeting terminated.

(Signed) CHAS. DICKINS,

Hon. Secretary, S. P. A.

Wynaad Planters' Association.

Proceedings of a Meeting held at Meppadi Club, March 9th, 1910.

PRESENT:—Messrs. Atzenwiler, Bisset, Emerson, Ewart, Macleod, W. R. McKenzie, Powell, Trollope, D. Squire, D. S. P., (Honorary Member) and C. E. Abbott, (Honorary Secretary).

Mr. Trollope in the Chair.

1570. *Proceedings of a Special Meeting held February 16th, 1910.*

—Mr. Atzenwiler proposed that these proceedings be not confirmed, giving as his reason that his amendment, which was seconded by Mr. Winterbotham, had not been put to the Meeting. Mr. Macleod seconded the motion. After some discussion, from which it appeared that proxies which had been sent to support Mr. Atzenwiler's proposal had been inadvertently used to vote for the amendment which was carried, it was agreed unanimously that the proceedings should not be confirmed.

The result of this is, that the Rule as to voting and subscriptions remains unchanged.

Proceedings of Ordinary General Meeting of February 16th were confirmed.

1571. *Scientific Officer*—*Read U.P.A.S.I. Circular 8* and Honorary Secretary's letter, which was approved, agreeing to the suggestion that the subject should be settled by the Secretary, U.P.A.S.I., the Planting Member, and Mr. Anstead.

Read U. P. A. S. I. Circular 6 about payments to above fund. The Honorary Secretary has made a further payment of Rs.131-4-0.

Read U. P. A. S. I. Circular 9, forwarding a letter from the Nilgiri Association suggesting that Mr. Anstead ought to visit Ceylon, offering to pay Rs.200 to his expenses, and asking other Associations to subscribe; read Honorary Secretary's reply, which was approved. The Meeting was of opinion that considering the large area and the varied interests of Mr. Anstead's present charge the tour should be postponed. It does not appear likely that the Coorg and Mysore Associations could benefit, except very remotely, by the proposed trip. But if Mr. Anstead thinks he ought to go, and if Coorg

and North and South Mysore have no objection, the Wynaad Association will not oppose the proposal.

Read *letter from Mr. R. K. Walker*, Director, East India Tea and Produce Company, Limited, taking exception to the statement made in Mr. Anstead's "Tour in Wynaad" in the January issue of the *Planters' Chronicle*, that "the District is hardly suitable for rubber; it grows very slowly."

Mr. Walker went on to say: "During a recent tour in Wynaad Mr. Nicol Thompson, who is a rubber expert, was so struck with the suitability of the District for Ceará that he has advised the Board of this Company to plant Ceará rather extensively. My own Pará and Ceará Estates are coming on very satisfactorily. I think most planters are aware that Ceará grows very rapidly."

The Meeting agreed with what Mr. Walker had written.

1572. *Planters' Benevolent Fund*.—Read and discussed *U.P.A.S.I. Circular 7*. The Honorary Secretary was instructed to write to Members, inviting subscriptions, and stating conditions.

1573. *Rules of Wynaad Planters' Association*.—These are to be printed and distributed.

1574. *Poodapardy Hotel*.—The Honorary Secretary was authorised to pay C. Shungaren Rs.50 for repairs.

It was resolved to ask to have a telegraph office opened at Poodapardy in connection with the Post Office.

1575. *Renewal of Bonus on Green Tea Manufacturer*.—Read letter from Mr. G. Gill, of Messrs. Harrison and Crosfield, who has recently visited Wynaad, on the subject of opening a market for tea in Quilon and erecting a Green Tea Finishing Factory there. The Hon. Secretary was instructed to address the Secretary, U.P.A.S.I., and Mr. Romilly, urging that the bonus on green tea be renewed.

1576. *Police Matters*.—The meeting resolved that the needs of the District would not be met if there is no investigating staff at Meppadi, and that we are put to considerable inconvenience by having none nearer than Vayitri.

The Chairman thanked Mr. Squire for attending the meeting.

A vote of thanks to the Chair terminated the proceedings.

(Signed) ALFRED TROLLOPE, *Chairman*,

C. E. ABBOTT, *Hon. Secretary*.

—; o :—

It is reported from Hawaii that experiments in planting *Hevea* rubber seeds indicated that they germinated and grew best when the shells were previously removed and the seeds planted in clean sand. The herring-bone system of tapping Ceará rubber trees gave quite favourable results, as many as 30 consecutive tappings being made by excising a thin slice of bark from the old wound. A good flow of latex was obtained during the whole period. The use of a water bag, or an ammonia bag, was found to increase the relative amount of first-grade rubber as compared with scrap rubber. Some difficulty experienced in coagulating the latex was overcome by the addition of hydrogen peroxide and sulphuric acid. Considerable difference was noted in the amount of latex obtained from yearling trees, which point is probably of value in indicating the trees which should be preserved in the permanent plantation.

INDIAN TEA ASSOCIATION, CALCUTTA.

Blister Blight.

Memo.:—The accompanying letter of 1st March from Dr. G. D. Hope, Scientific Officer of the Association, with regard to the above subject is issued for general information.

Dated Calcutta, 1st March 1910.

From—Dr. G. D. Hope, Scientific Officer, Indian Tea Association.

To—The Assistant Secretary, Indian Tea Association.

During my visit to Pusa I had the opportunity of discussing the subject of Blister Blight with Dr. Butler, the Imperial Economic Mycologist and with Mr. McKae, who has made a special investigation of this disease during the past year. Mr. McKae's report is now in the press and is unlikely to appear for several weeks. In it he makes various suggestions with regard to measures which, if carried out immediately and universally, in all the affected areas of the Darjeeling tea districts, will, in his opinion, do much towards the preventing the disease recurring.

He draws attention to the necessity of (1) ascertaining at once whether blisters are now present on any of the leaves remaining on the bushes, (2) the removal and destruction of these in such a way as to prevent as far as is possible dissemination of spores, and (3) the spraying of bushes in the neighbourhood of those on which blisters are found.

These preventive measures should be taken in hand at once, and continued throughout the early part of the year, whether the blight appears to be increasing or not, and would emphasise the importance of adopting them. Mr. McKae is of opinion that if the blight can be successfully held in check during the early part of the year it may not appear in epidemic form later, and that it may be possible by this means to control the blight in future.

All blistered leaves should be removed and either burnt *in situ* or their buried at least one foot deep in trenches. Carriage of infected leaves for any distance should be as far as possible be avoided.

All the bushes in the neighbourhood of those on which blisters are found should at once be sprayed with Bordeaux mixture in such a way that both sides of the leaves are covered; for spore formation and infection take place chiefly on the under sides of the leaves.

—: o :—

A fertilizer experiment was made in Hawaii some months ago with rubber plants, the wire-basket method devised by the Bureau of Soils of the U. S. A. Department of Agriculture being used. The results for Pará rubber show that where manure, sodium nitrate, or lime was the single fertilizer, transpiration increased materially. Combinations of acid phosphate and potassium sulphate gave a large increase, but acid phosphate in other combinations either decreased the transpiration or gave but little increase.

In the work with Ceará rubber the best results were obtained with lime, sodium nitrate, and the two combinations, sodium nitrate, and potassium sulphate, and sodium nitrate, potassium sulphate, and acid phosphate. Manure alone and potassium sulphate alone gave fair results. The experiments as a whole indicated that sodium nitrate used alone is a good fertilizer for rubber trees, while acid phosphate appears to have some deleterious effect upon them.

RUBBER.**Eastern Planting Interests.****PROPOSED AMALGAMATION.**

Mr. Quincy Tucker, of Boston, U.S.A., sends the *India-Rubber Journal* the following proposal for the amalgamation of the British rubber-producing estates in the East.

Sir,—Whereas the notably successful cultivation of the Pará rubber tree in the "Middle East" is due entirely to the pluck, persistence and farsightedness of the British it is the purpose of this brief circular letter to outline a simple but effective plan for protecting the British rubber trade. More particularly the scheme mentioned below is intended to assist the rubber factories in Great Britain, who have been handicapped by foreign invasion and the evils of free trade; also the original, sound (and not over-capitalised) plantation companies who were organised, say, prior to July 1st, 1909.

It is suggested that the "Consolidated British Rubber Companies, Ltd.," be formed, taking in the import British manufacturers, and planters, or as many who would see the advantages of such a merger with the surplus "water" eliminated from the shares, the latter task preferably to be supervised by a royal commission headed by such a noble character as the Right Honourable Lord Avebury. In other words, try and make the British rubber combine as sound as the Bank of England.

Anticipating the opposition of brokers and dealers, those that assist the merger could be put in charge of the crude rubber department—a sort of clearing house so to speak. The benefits accruing from such a combination are as follows :—

1. Obtaining crude rubber at cost of production of 1s. 6d. per lb. and downwards, thus eliminating the speculator's profits and tremendous fluctuations in prices and also blocking dishonest promoters of "wildcat" plantations recently floated on false reports.
2. Averting the possible future control of Eastern plantation by the manipulations of a still bigger American rubber "trust." (The Canadian Consolidated Rubber Co. has already virtually passed out of British hands.)
3. Increasing home industries; giving work to the unemployed in British rubber factories, and in lines catering to that trade, such as makers of machinery, etc.
4. Giving the consumer a better quality of rubber goods by the use of more new Pará rubber.
5. Where the mills demand "hard fine Pará" buy it for them, until they are satisfied that rubber from eight years old Eastern plantation trees coagulated by the Da Costa system into smoked sheet (without acid) or cured by the Wickham smoked system, is equal to Brazilian caoutchouc.
6. Sell the surplus crude rubber abroad, favouring the factories who would agree not to invade Great Britain with their manufactured products.
7. Now is the proper time to form the British rubber combine before the Yankees discover their mistake (so the author justly claims) of dabbling in low grade gums, soon to be wiped out by an avalanche of Pará.
8. To safeguard Eastern plantations more efforts must be devoted in the future to the protection of the trees against diseases and pests, such as wide planting and retaining every 50 acres or so jungle barriers. Also not to cut out Eastern "Ficus;" or such other trees as found in Brazilian and Bolivian forests, and to ignore this fact will surely lead to serious trouble. Engage a large crop of experts to cope with any blights which may appear.

9. The consolidation at first might benefit more the manufacturers, but in four years with the probable over-production of crude rubber, the planters would be the gainers. Finally a national benefit is derived. . . .

(Signed) QUINCY TUCKER.

February 8, 1910.

1. Everton Street, Dorchester,
(Boston), Mass, U. S. A.

The Coming Boom.

Two months of rapid appreciation in the quotations of the leading rubber shares have awakened in the minds of the small group of journalists and market protagonists who aspire to direct the public in its choice of investments a feeling of unrest, which they do not hesitate to attempt to communicate to their clientèle.

The jeremiad is no new form of prophecy as applied to the rubber planting industry; prophets of disaster have been with us from the first, and yet nothing is more apparent than that the rubber share market gains in strength every day.

That there is no reason for apprehension as to its immediate future, but that on the contrary its prospects are rosier than ever, are two conclusions to which we have come.

The incipient boom lately experienced affords very strong evidence of the strength of the market. During its course many purchases were naturally made on speculative account by the weak bull element, and a large number of new jobbers unversed in the intricacies of the rubber market entered the lists. Yet when the usual profit-taking break occurred the liquidation was over in a few days and strong buying took place at the slightly lower levels. Since then the market activity has continued without abatement, and the position from the almost entire lack of carrying-over facilities is strong.

The number of shareholders in rubber companies has been tremendously augmented of late, and the market also possesses the advantage of having behind it the large number of solid investors who have been in rubber from the beginning, who have made their money in it and are not likely to be affected by small setbacks and market scares. For the faith that is in them, these experienced investors may be relied upon to come in with substantial support on any small relapse.

That the present activity is but an earnest of the unprecedented boom to come is strongly averred by many prominent houses. The head of a well-known firm of brokers during a recent week of phenomenal advances expressed this belief very confidently on being asked to give his opinion of the situation. He said, in effect, "after the present rise is over, there will be a period of considerable activity without, however, the same effect on prices, and then will follow the biggest boom the city has yet seen." . . .

One result of the present activity is the flotation of a large number of new companies, many of which are far from desirable propositions, and the "making" of a market in a few even less desirable descriptions. A number of new indigenous rubber propositions have appeared which, while they may offer speculative opportunities, are on the whole to be deprecated as tending to reflect upon the general soundness of the industry. The year 1910 has seen some very doubtful propositions carried through with exceptional speed, and the prices of the shares have been rushed up to ridiculous figures. It is a matter for regret that we can no longer claim to have a perfectly clean market in rubber shares; we do hope that all investors will carefully scrutinize the companies already floated and those still due before participating to any serious extent.—*The India-Rubber Journal*, February 21, 1910.

The Planters' Chronicle.

RECOGNISED AS THE OFFICIAL ORGAN OF THE U. P. A. S. I., INCORPORATED.

VOL. V. No. 10]

MARCH 26, 1910.

[PRICE, AS. 4.

THE U. P. A. S. I.

(INCORPORATED.)

The Scientific Officer.

Mr. R. D. Anstead left Bangalore on Thursday night (24th instant) to visit the Mundakayam and Central Travancore planting districts. He expects to be back just before the middle of next month, and it is hoped that within a few days after that time he will be able to visit other districts, such as the Shevaroyes and the Nilgiris.

The suggestion that he should proceed to Ceylon has not met with general approval, planters in some districts considering, quite naturally, that he should make a tour in every one of the planting areas of Southern India before going farther afield.

"Chakte Sappu."

Mr. Thiselton Anderson writes, under date 21st March 1910 :—

"In your issue of the 19th inst., page 102, I notice that you ask for the botanical name of the leguminous plant known in Canarese as '*Chakte Sappu*.'

"Mr. Anstead recently classified a number of these plants for me and he gives the name of '*Cassia Tora*' for the *Chakte Gidda*, a plant which grows in the Malnaad, and '*Cassia Occidentalis*' for the *Kari Chakte Gidda*, a plant very similar in appearance which is a native of the maidan tracts."

To Judge from this, the *Chakte Sappu*, about which an inquiry was made last week is *Cassia Tora*. If that is the case, it is of little value as a leguminous plant for the purposes for which the Scientific Officer advocates the use of such plants.

Seeds were very kindly sent to the U. P. A. S. I. lately by a planter, but it is to be feared that this plant will not serve the purpose in view as well as various other plants.

Perhaps, however, some further information about this plant may yet be forthcoming. In the meantime it is proposed to raise a few seedlings for the purpose of correct identification.

A Correction.

In Mr. Paul's advertisements in recent issues fruit trees were quoted Rs.3-8 each. Mr. Paul was absent at the time. On his return from Europe he pointed out the mistake that had been made, the true price being Rs.5-8 per plant, as announced on another page.

Scientific Officer's Papers.

XXII.—THE FERTILISING INFLUENCE OF SUNLIGHT.

The following interesting letter on this subject appeared in *Nature* for 17th February 1910:—

"The past history of agricultural science furnishes several examples of belated explanations of the utility of practices the value of which has long become a tradition among practical men. The explanation of the value of leguminous crops in agriculture is a good example. While the recognition of the rôle of these crops in increasing the nitrogen supply in the soil has done much to improve agriculture in new countries, it has only served to provide a scientific approval of the cultural practices of ancient civilisations, such as that of India, where from time immemorial it has been the custom to grow leguminous crops in the rotation and also as one of the constituents of the mixed crops cultivated in many parts of the country.

"Agricultural science has recently provided another explanation of an ancient Indian practice. In the *Journal of Agricultural Science* of October last, Drs. Russel and Hutchinson have found that partial sterilisation of the soil by heating or by poisons leads to an increase in the supply of nitrogenous compounds and to increased fertility. These investigators state that partial sterilisation of the soil kills off the phagocytes which live on bacteria, and also large organisms inimical in other ways to bacteria. At the same time the soil bacteria are killed off, but the spores remain, which germinate and rapidly multiply when the soil is moistened. The new bacterial cultures increase at an enormous rate, and the resulting nitrogenous plant food becomes so great that the plant growth is greatly stimulated. The authors go on to state (p. 120):—"There is reason to suppose therefore that the large destructive and competing organisms will be found of common occurrence in ordinary soils checking the beneficial bacteria and limiting fertility. An important practical problem arises: is it possible to suppress them in ordinary field soils by any economical and practical process?"

"The practice among many of the best cultivators in the Indo-Gangetic plain furnishes a most emphatic affirmative to the above question. It has been the practice of the ryots for centuries past to expose the alluvial soils of the plains of India to the intense heat and light of the Indian hot weather in April and May. The beneficial result on the succeeding crop is extraordinary, and has all the effect of a nitrogenous manuring. It is much more than probable that the result of this weathering is a partial sterilisation of the soil, and that Russell and Hutchinson's explanation is the correct one. Except in market garden crops near the cities and in crops like sugar-cane and tobacco, manures are but little used in India. The growth of leguminous crops and the weathering of the soil during the hot season appear to be sufficient to keep up the fertility. More nitrogenous manure would no doubt be an advantage, but a great deal could be done by the cultivators themselves in weathering the soil during the hot weather in a more efficient manner than at present.

"The extended use of cheap light iron soil-inverting ploughs during the hot, dry weather after the *rabi* harvest would do much to bring about a better exposure of the soil to the sun, and a more complete sterilisation. The wooden ploughs now in use are not adapted to open up the heavier lands unless they are moistened by rain, and in consequence a large area of the arable land is not ploughed at all until the monsoon. We consider one of

the greatest improvements possible in Indian agriculture would be to impress on the ryot the value of weathering all arable lands in April and May to a much greater extent than is done at present. When iron has taken the place of wood in the ploughs of the Indo-Gangetic plains, it will be possible for the cultivator to take the fullest advantage of, and greatly extend, their present most admirable practice. In collaboration with Mr. H. M. Leake, Economic Botanist to the Government of the United Provinces, we have in progress a series of experiments in which the practical effect of weathering during the hot months on both the yield and quality of wheat is being ascertained.

(Signed) A. HOWARD,
G. L. C. HOWARD.

PUSA,

November 18, 1909.

In *Nature* for March 3, 1910, Mr. E. J. Russell, of the Rothamsted experiment station, wrote that the above letter by Mr. and Mrs. Howard "raises a question of much scientific interest and of considerable importance in tropical agriculture. In some of the text-books it is stated that the hot sunshine of tropical or sub-tropical climates must injure the productiveness of the soil, since it kills bacteria. On the other hand, experiments on the partial sterilisation of soil by other means, such as heat or volatile antiseptics—shows that the killing of bacteria (as distinct from spores) leads to an increased, and not a diminished, productiveness. The apparent discrepancy is now cleared away, and we have Mr. and Mrs. Howard's authoritative statement that strong sunlight has beyond question a beneficial effect on productiveness.

"There is a close resemblance between the effects they describe and those that have been obtained with partially sterilised soils by myself in conjunction with Dr. Darbishire and with Dr. Hutchinson; in all cases the effect is that of a dressing of nitrogenous manure. Dr. Hutchinson and I have traced this to an increased rate of decomposition of organic matter after partial sterilisation, and have shown that the increased activity is due to the destruction of some agent, probably large organisms, which had previously interfered with bacterial development. The question is, could sunlight partially sterilise a soil and kill the large destructive and competing organisms that we suppose limit productiveness."

"There are at least three factors involved; sunshine dries the soil, heats it to a certain temperature, and may have a direct chemical action fatal to the cell. We are at present studying the effect of dryness and of temperatures lower than 100° (at which we have previously worked), but the direct effect of sunshine is not easily investigated here. Some preliminary experiments I made at Wye during the summer of 1905 indicated that soil exposed to bright sunshine for a period of ten days subsequently absorbed oxygen more rapidly, *i. e.*, showed a higher rate of bacterial activity, than another lot kept shielded from the light. The effect was comparable with that produced by volatile antiseptics, and, so far as the experiment goes, it shows that sunlight could, equally with these, remove the factor limiting productiveness in ordinary soils. I have several times attempted to extend the experiment, but have been unfortunate in timing it, and have missed the continuous spells of strong sunshine.

"We could not hope to attack the problem so successfully here as in India, and it would be interesting to have some Indian work on the subject."

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RUDOLPH D. ANSTEAD, *Planting Expert.*

Notes and Comments by the Scientific Officer.

22. *Application of Fertilisers.*—Enquiries are constantly being made as to the best way of applying fertilisers to the soil. As a general rule, *all fertilisers should be broadcasted evenly over the soil* and if possible lightly covered over with mulch or soil. This method of application will give better results than localising the fertiliser in pits.

The fertiliser should be mixed with the soil as intimately as possible, especially when it is not very soluble. Soluble fertilisers are rapidly dissolved by rain, dew, &c., and carried down into the soil in solution and thus very intimately mixed with it, and herein lies one of the great advantages of using a soluble fertiliser.

The more evenly a fertiliser is spread over the surface of the soil the more intimately it will be finally mixed with it. When small quantities of a fertiliser are to be applied they should be first mixed with sand, or dry earth, so that they can be evenly broadcasted. The same thing applies to insoluble fertilisers like Basic slag.

The only exception to this rule of applying fertilisers by broad-casting is the case of young plants which have not got a root system spreading all through the soil. These may require a stimulant, and it must be placed near them where their roots can get it.

23. *Ferrous Sulphate.*—I have received several enquiries as to the price of this fungicide. Messrs. Parry & Co. wrote me on 5th October last and quoted a price of Rs.72 per ton, c. f. i. Mangalore, and implied that should there be a demand this price could be lowered. It will be noted that it is quite a cheap material for the purpose for which it is recommended.

24. *Iron as Plant Food.*—Two kinds of iron compounds are found in the soil, known as *Ferrous* and *Ferric* compounds. The former are changed into the latter by the action of the air in a well aerated soil, by a chemical process which is called *oxidation*. Ferrous compounds are detrimental to plant life, but all plants require iron in the Ferric state, though in very minute quantities. Iron is an essential constituent of protoplasm and chlorophyl.

Ferrous Sulphate acts as a fungicide, and when applied to the soil to kill fungi such as those which cause Stump Rot of Coffee, must be applied in small quantities, or damage will be done to the Coffee. A dose of about 6 ounces per tree, broadcasted and lightly pricked into the surface soil, just before a period of light rains, is recommended, but the method is to be considered at present as a purely experimental one, and should be adopted on small experimental areas only.

25. *Lady Birds.*—Lady Birds are small beetles, mostly yellow, red, or black in colour, the biggest kinds being about half inch long, and the average sized kinds about a quarter of an inch long.

The majority of them feed on Aphides and Scale Insects, and are beneficial insects and as such should be protected and encouraged.

The eggs are usually laid in small groups among a colony of Scales or Aphids. The larvae which hatch out feed on these insect pests, and finally reach the pupal stage and emerge as the perfect insect in the usual way.

RUDOLPH D. ANSTEAD,

Planting Expert.

DISTRICT PLANTERS' ASSOCIATIONS.**Anamalai Planters' Association.**

Proceedings of the Seventh Annual General Meeting, held at the Monica Bungalow, Valparai, on Wednesday, the 16th February, 1910.

PRESENT :—Mr. E. W. Simcock, Mr. H. W. deSalis, Mr. R. F. Vinen, Mr. R. F. Lushington, Mr. G. L. Duncan, Mr. C. H. Brock.

Mr. E. W. Simcock was voted to the Chair.

1. Read the Proceedings of the General Committee at Meetings held on the 6th December 1909 and the 12th January 1910, and confirmed after previous circulation.

2. *Annual Report.*—The Honorary Secretary read his report, which was as follows :—

Gentlemen,—I have the pleasure of laying before you the report for the past year, and submit for your approval the accounts, which I trust you will find in order.

This year the accounts have been carried on to the end of the calendar year, and the subscriptions not being called until last month, left the finances of the Association at a very low ebb at the close of the year.

Planting Member.—The Hon'ble Mr. J. G. Hamilton was re-elected to the Legislative Council of Fort St. George under its re-construction Reform.

Leases.—I am pleased to be able to announce that the Anamalai Leases, which have been delayed for thirteen years, are now actually being issued. I regret to say that Government have refused to accept this Association's proposed amendments to clauses Nos. 19, 20 and 52, but they have conceded the other suggestions. I hope that this long standing subject is now dead and will not have to be raised again in any future report.

Proposed Hospital.—I am unable to say anything definite on this subject, but I think there is every reason to hope that the Hospital, which we have been struggling to get for more than a year, will come, as our representations have on the whole been dealt with in a sympathetic manner on the part of both official and medical authorities, and if it had not been for an unexpected delay we would have had our District Medical Officer with us at this Meeting to discuss the subject.

Liquor Traffic.—There has been a good deal of correspondence on this subject which has not amounted to much in results, and the evils arising from the illicit sale of arrack show no signs of abatement.

Labour Problems.—In common with most District Associations this Association entirely fails to see how Act I of 1903 can possibly relieve the labour situation, but in spite of this Association's repeated representations, the support that we have received from other Districts to our Scheme for Registration has been very meagre. From replies received from some Districts it appears that the majority, though admitting the evils, fear to take any action to alleviate them, and we appear to be no forwarder than we were three years ago.

Coffee Stealing.—As last year, the police arrangements for the prevention of Coffee thefts have been systematically and thoroughly carried out, and, as far as I can gather, successfully so.

The Planters' Benevolent Fund.—This Fund has been well supported by nearly every member of this Association, and it is to be hoped that the

two or three Members whom I have not yet heard from will also add their support.

Cinchona.—Government have not acceded to this Association's request that a minimum price of one anna per unit should be paid for Bark supplied to them, but there is just a possibility of this subject being more favourably re-opened.

Roads and Communications.—I understand that the District Board have been taking steps to improve the road between Coimbatore and Vannanthorai, but there is now more trouble on this subject in the District itself. The matter is *sub judice* at present, and so I have nothing to report as yet.

The District Board.—On the resignation of Mr. Windle, Mr. G. A. Marsh was nominated to represent this Association on the Coimbatore District Board.

Rules.—During the latter part of the year the rules of the Association were thoroughly revised, and the new rules as passed on the 8th November last are now in force, so that from to-day the Association will have its Chairman and Vice-Chairman for the year for the first time.

In conclusion, I have to place my resignation in your hands and to state that circumstances over which I have no control compel me to withdraw from standing for re-election. I have to thank every member, and especially the members of the Standing Committee, for the ready help they have accorded me during my short term of office.

The Report as read was adopted. A cordial vote of thanks, proposed by the Chair and seconded by Mr. Duncan, to Mr. Brock for his work as Honorary Secretary, was passed.

3. Accounts.—The Honorary Secretary presented the Accounts, audited by Messrs. G. A. Marsh and C. R. T. Congreve, and approved by the General Committee. The accounts were then passed.

4. Election of Office-Bearers.—The results of the Ballot was as follows :—

Chairman—Mr. G. L. Duncan.

Vice-Chairman—Mr. C. H. Brock.

5. Abkari Report.—Read copy of the Deputy Commissioner's Proceedings D. No. 117 of 1910, dated 8th January 1910, enclosing copy of the Trichinopoly Assistant Commissioner's letter R. C. R. 1619-09, dated 5th January 1910, to the Deputy Commissioners, Southern Division, stating that the Department is carefully watching for illicit transport of Arrack to the Estates and looks for co-operation in the matter from Members of the Association. The Deputy Commissioner is of the opinion that the best course to stop transport to the Hills by private persons is for the Association itself to undertake the sale of Liquor, under the permission given in B. P. No. R. Abk., 58, dated 16th January 1908. Recorded. Mr. Simcock was requested to supply the details of the latest case of neglect of duty on the part of the Abkari Officials to the Honorary Secretary, and the latter was instructed to write to the Assistant Commissioner with reference to the same, and to forward copies of the whole correspondence to the Head Assistant Collector, Pollachi.

6. Branch Roads.—Read letter to the Secretary to the Government dated, 27th January 1910, requesting a reply to the former letter. The Honorary Secretary then read the following resolution notified by Mr. Duncan :—

"That in view of Government's refusal (vide G. O., No. 266 W., dated 5th March 1907) to construct any of the Branch or Feeder Roads then asked for, this Association learns with surprise that Government, without any intimation, has undertaken to construct, or pay for the construction of, one of these, *viz.*, the Korringamuddi-Kalianapanal cart road, and that inasmuch as the several roads referred to were then all declared to be on the same footing, the Government be asked to proceed with the construction of the other three roads referred to in the programme."

Proposed by Mr. Duncan and seconded by Mr. Simcock.—Carried unanimously.

7. *Public Bazaar and Chuttrum*.—The Hon. Secretary announced that he had received no reply regarding this subject from the Collector although he had again reminded him on the 8th February, 1910. Recorded with regret.

8. *Cinchona*.—Read letter from Hon'ble Mr. J. G. Hamilton, dated 26th January, 1910, and reply in acknowledgment, dated 8th February, 1910. Recorded.

9. *Proposed Hospital*.—The Honorary Secretary announced that he had received no further communications on the subject.

10. *Leases*.—Read letter from the Collector, dated 21st January 1910, giving the substance of the orders of Government with regard to issue of Leases, and notifying that the District Forest Officer was to get them issued without further delay. Recorded with satisfaction.

11. *Membership Roll*.—Messrs. A. H. Sharp, R. F. Vinen and A. C. Cotton were elected members of the Association. Mr. Simcock proposed and Mr. Brock seconded, that Mr. R. D. Austead should be elected an Honorary Member of the Association.

12. *Labour Rules and Rates*.—Read the following Labour Rules passed by the General Committee at a Meeting held on the 6th December, 1909.

Rule 1.—The Estate on which a labourer is first employed on Check Roll from and after the 1st of June of any season shall have the prior claim on such labourer's services to the 31st March following. Any such labourer who has bolted to another Estate in the District on being claimed by the Estate to which he belongs shall be returned without demur.

Rule 2.—In the event of any labour being discharged from any Estate for misconduct, the employer discharging such labour may notify all members direct giving particulars. Passed.

13.—U. P. A. S. I.

a. *Indian Tea Cess Committee*.—Read Circular No. 3 announcing that Mr. Romilly was unable to attend the Tea Cess Budget Meeting. Recorded.

b. *Proposed Coffee Cess*.—Read Circular No. 4 with reference to the particulars required in ascertaining the amount of support that the proposed Coffee Cess receives from all planters. The Honorary Secretary announced that all replies received up to date were in support of this scheme. Recorded.

c. *The Indian Tea Duty*.—Read Circular No. 5, notifying that the Government of Madras have refused to entertain the suggestion that the duty on all Tea imported into India may be raised to 4 annas a lb., as being opposed to the principles on which the Indian Tariff is based. Recorded.

d. *The Scientific Officer*.—Read Circular No. 4 with reference to the election of Mr. R. D. Anstead as an Honorary Member of the Association.

A vote of thanks to the Chair terminated the Proceedings.

(Signed) C. H. BROCK, *Honorary Secretary*.
E. W. SIMCOCK, *Chairman*.

The following is extracted from Notes on Economic Plants in Reports on the Botanic Station, Experiment Plots, and Agricultural School, Dominica, 1908-9:—

Pará rubber (*Hevea brasiliensis*).—A small plot of twenty plants of Pará rubber was started in July, and thirteen plants were placed out on the hillside near the plots of *Castilloa* and *Funtumia*. The number of specimens of *Hevea* now growing at the gardens is fifty-two. Only three are old enough for tapping. Eight other plants should shortly attain sufficient circumference of the stem to allow tapping to be commenced.

Following the suggestion of Wright in his work on *Hevea brasiliensis*, it is proposed, when twenty plants which form the small plot have sufficient length of stem, to disbud them from time to time in order to produce low, bushy trees. The other specimens will be allowed to develop naturally. This question of low trees will be an important one in Dominica, as such trees can be better protected from the wind.

Disbudding causes numerous shoots and a great increase of foliage, which tends to increase the circumference of the stem of trees so treated. This gives a larger area for tapping and a greater yield of rubber.

It is advised that Pará rubber in Dominica should be planted in sheltered positions. If planted in open positions the land should be as effectively protected by wind-belts as in the case of cacao cultivation.

Two thousand seeds were imported from Singapore. The germination was at the rate of 50 per cent.—not nearly as satisfactory as in the previous year, when 80 per cent. of the seed obtained from Ceylon grew. In addition to the above 6,000 seeds were obtained for planters.

During the year, 1,262 Pará rubber plants were sold.

Tapping experiments made in Dominica on various rubber trees such as *Hevea*, *Castilloa*, *Funtumia* and *Ficus*, show that *Hevea* trees are the easiest to tap and give the best yield. The preparation of the rubber is extremely simple, and the product, when placed on the market, commands the highest price of all rubbers.

It is stated that Pará rubber in Ceylon growing under good conditions may be tapped when six years old, and that practically all the trees are ready to yield rubber when eight years old.

Ecanda rubber (*Raphionacme utilis*).—An interesting article on this recently discovered rubber plant appeared in the *Kew Bulletin*, No. 5 of 1908, page 209. A supply of seed was received from Kew early in February, which has germinated well, and plants are now under experimental cultivation.

The *Kew Bulletin* states: 'It differs from all the rubber plants already known in so far as it is a dwarf herbaceous plant with a fairly large subterranean tuber abounding in caoutchouc.'

Experiments with this plant will be carefully carried out. It is said to grow in dry localities, and may be treated as an annual or biennial. A rubber plant that can be grown as an annual root crop appears to have distinct possibilities in the West Indies, should the climate be found to suit it.

RUBBER.

The Rubber Growers' Association.

The following are extracts from the report of the executive committee, 1909 :—

The membership of the Association has been increased during the year under review, and 24 meetings of the various Committees have been held.

The Malaya Section of the Association have employed a firm of Chemists to send out an Assistant Chemist to the Federated Malay States to conduct experiments with regard to the curing and preparation of rubber. A special fund has been subscribed by some of the companies possessing estates in the F. M. S. to cover the cost of the expenses. Government has granted the free use of the laboratory at Kuala Lumpur to the Association for the use of the Chemist in his investigations.

The activities of the Association have been chiefly in connection with questions affecting rubber production in the Federated Malay States and Ceylon. Other centres of the industry where production has not yet reached the stage of development existing in these countries have not yet had any questions which require combined action. The Association is, however, ready, through its various Committees, to second the efforts and further the interests of rubber planters in those centres where the industry is less advanced, and which may be expected to benefit as time goes on by the combined action which such an organization renders possible.

RESEARCH CHEMIST FOR CEYLON.

Dealing with the establishment of a Research Station and Laboratory in the Federated Malay States, and the employment of a Chemist to conduct experiments with regard to the curing of rubber, the Committee states :—

The Ceylon Committee of the Association considered the advisability of establishing a research station in Ceylon, and employing a chemist to conduct experiments with regard to the curing of rubber and as many home Companies possessing estates in Ceylon were in favour of the proposition, the Committee conferred with Mr. Joseph Fraser and requested him to convene a meeting in Ceylon with the object of suggesting a definite scale of contribution from the various estates, in order to meet the expenses. The Committee were of opinion, however, that no contribution from any one estate should exceed the sum of £50 per annum, and that guarantees should be limited to that amount. A Sub-Committee was appointed (consisting of Messrs. A. Bethune, Alfred Brown, G. A. Talbot, and R. Hoffmann) to make provisional arrangements for the employment of a research chemist, and for the use of a laboratory in Ceylon. This Sub-Committee held several meetings and took into consideration the experience gained by the Malaya Section of the Association who have already despatched a research chemist to the Federated Malay States, and are of opinion that it is necessary for the work of the Chemist to be technically directed. The Sub-Committee have, therefore, provisionally arranged with Messrs. Clayton, Beadle and Stevens to direct the work of a research chemist who will go to Ceylon and carry out experiments on the subject of the curing and manufacture of plantation rubber, the firm to themselves conduct experiments in conjunction with the research work in Ceylon. In all matters other than scientific direction the chemist shall be controlled by a Committee in Ceylon appointed by those members subscribing to the expenses of the scheme. The Ceylon Committee have received universal approval of this scheme from Home Companies.

SELECTED CUTTINGS.

The Sterilisation of Soil.

"Ever since it began to be realised that the soil is the home of a great number of minute organisms—bacteria and fungi—as well as of larger organisms like infusoria and eelworms, there have not been wanting experiments in which attempts were made to grow plants in soil which had been deprived of these living agencies. The results, however, that have been reported have been contradictory and difficult of explanation, and when also of late years certain gardeners began to use sterilised soil on a practical scale there has been a similar conflict of evidence as to the value of the treatment. The gardener has tried soil sterilisation, nearly always by heat, for various reasons; in the first place, he hoped to get rid of the seeds of weeds and the spores of the mosses and liverworts which encrust the surface of seed-pans whenever germination is long delayed; again he hoped to kill off the spores of certain fungoid diseases which harbour in the soil, and the eelworms and similar organisms which often do so much harm to cultures under grass. Any process of sterilisation by heat, involving the heating of the soil, either wet or dry, to the temperature of boiling water, must be expensive, but whether it may prove to be commercially profitable or not, it is only very recently that we have learnt what sort of changes go on in the soil during the process and have arrived at some understanding of the reasons for contradictory results mentioned above.

"The experimental investigation of the subject began with the discovery, in which several men shared, that soil which has been heated to the temperature of boiling water will grow larger crops than the same soil which has not been treated. In this country Russell and Derbyshire carried out a long series of such experiments, and showed that the heated soil will produce double the yield of the untreated soil and the beneficial effect persists as far as four crops after the original heating. All the plants they tried were benefited, except the leguminous species, and all kinds of soils behaved in the same way. Moreover, not only did the gross weight of the crop increase, but on analysis it proved to be richer in such essentials of plant food materials as nitrogen and phosphoric acid, so that the crop grown on the soil after heating actually contained about four times as much nitrogen as that grown upon the soil which had not been heated. Various explanations of the action were put forward, mostly depending upon changes which were supposed to have been set up in the bacterial flora of the soil; but Pickering, as a result of his experiments, suggested that in the main the action was due to the splitting up of the organic matter (humus) of the soil by the heating. He showed that the germination of seeds is retarded in soil that has been heated, and that the retardation is greater, the higher the temperature to which the heating is pushed; he also showed that the soil after heating actually contained more nitrogenous compounds in a soluble state. Hence he concluded that the heating had split off from the humus soluble nitrogen compounds which are injurious to germination, but which later will serve as food for the growing plant. Pickering's results are undoubtedly correct, in that ammonia and other soluble nitrogen compounds are split off from the humus by the heating; but some work which has just been published by Russell and Hutchinson, of the Rothamsted Laboratory, shows that this is only part of the story, the increase in the fertility of the soil being chiefly due to a re-arrangement of the living organisms inhabiting the soil. In the first place it can be shown that heating to the temperature of boiling water for ten hours or so does not sterilise the soil; certain groups

of organisms are killed off entirely, but others which exist in the form of spores resist the heat, and as soon as the soil cools down again begin to develop and multiply with great rapidity. For example, the bacteria bringing about nitrification are wiped out entirely, but most of the other groups retain some representatives, especially that class which take the complex organic matter of the soil and break it down into ammonia and kindred compounds. In one of the Rothamsted arable soils used in the experiments the normal number of the bacteria in the soil before treatment was about 5,000,000, per gramme; immediately after heating the number had fallen to 60 per gramme, but then followed a very rapid rise; in a fortnight the original 5,000,000 had been reached and a month or 5 weeks afterwards the number had risen to 26,000,000 per gramme.

"Step by step with this increase in the number of bacteria in the soil came a similar increase in the rate of production of ammonia, *i.e.*, of a soluble nitrogen compound on which the plant could feed. It was thus demonstrated that, in the soil that had been heated, the increased crop is due to the greater amount of ammonia which becomes available for the plant, and that this increase in the ammonia is brought about by the larger number of bacteria, chiefly splitters-off of ammonia, which get a footing in the soil. Various experiments, which need not here be detailed, also demonstrated that the increase in numbers of the bacteria is not due to any stimulus derived from the heating, but to the removal of some factor which is at work in ordinary soil keeping down the numbers of bacteria. This new and unknown factor turns out to be the presence in ordinary soil of large non-bacterial organisms like amoebæ and infusoria, which habitually feed upon the bacteria, and thus, by keeping their numbers down, establish a certain equilibrium between themselves and the bacteria. These higher organisms are wholly destroyed by the heating or other sterilisation methods, whereas the bacteria are only partly exterminated and afterwards develop to a much greater extent than before, because they have the field to themselves. With this increase in the number of bacteria goes on an increased production of soluble plant food from the insoluble reserve in the soil and a corresponding increase in crop. With certain differences these results are repeated when other methods of sterilising the soil are adopted; if, for example, the soil in a dry state is exposed for some hours to the vapour of chloroform, carbon bisulphide, toluene or other volatile antiseptic, there is a similar arrangement of the organisms of the soil and a similar increase in its fertility, though not to so great a degree.

"We are now in a position to sum up the changes which take place in soil when it is subjected to one of these so-called "sterilisation" processes.

- (1.) Seeds of weeds, mosses, liverworts, &c., are killed. Fungi and their spores are also destroyed. It is found, however, at Rothamsted that the soil is very susceptible to reinfection when it is afterwards exposed in pots. Occasionally it becomes covered with moulds, and the usual green algae rapidly cover the surface with a mat.

- (2.) The texture of heavy soils is distinctly improved.

- (3.) The heating gives rise to substances, of which ammonia is probably the chief, harmful to germination. This harmful effect will be less marked if the soil is stored for a time after the heating.

- (4.) All organisms of an order higher than bacteria are killed off; the soil, for example, is rendered clean of eelworms, at the same time certain organisms which normally limit the number of bacteria in the soil are destroyed.

(5.) Thus provided with a clear field, the ammonia-producing bacteria increase rapidly and there is a correspondingly greater production of plant food from the soil and manure, followed by an increase of crop. Certain groups of bacteria are killed off, e.g., those which convert ammonia into nitrates; hence plants which take in their nitrogen as nitrates do not show increased growth on the sterilised soil; only those plants (actually the majority) which can utilise indifferently ammonia or nitrates are benefited. Even in their case it is possible to see that they are feeding upon ammonia and upon the nitrates they obtain from normal soil, e.g., the cereals are shorter in the straw than would be expected from the richness in the nitrogen. Nor is it always possible to reinoculate the soil with the nitrification organisms, heat sterilisation seeming to produce some substance which inhibits the nitrification bacteria.

"Space does not permit of a discussion of the results of greenhouse practice with sterilised soils in the light of these conclusions, but they will be found to illuminate much that has been obscure and contradictory in the reports. At any rate, it is clear that it is impossible to lay down the law before hand as to whether "sterilisation" of soil will or will not be beneficial in a particular case. Experiment alone can show which of the numerous factors will be involved. Similarly, though a number of applications to practice suggest themselves, it would be unwise to discuss them until more experimental work is forthcoming."—*The Gardeners' Chronicle*, October 23rd 1909.

[This subject is referred to in Sc. O. Paper xlii (page 114). What is written there and in the article quoted above is regarded by the Scientific Officer as an argument in favour of clean weeding and keeping the ground exposed during the dry season, but it must be remembered that the system advocated above is for short annual crops on the plains. The most excellent advice to ryots given by Mr. and Mrs. Howard does not necessarily apply to planters in the hills, for when the crop is a permanent one, like Tea or Rubber, the case is somewhat different. Then the damage caused by loss of moisture during the dry season from the exposed soil may more than counterbalance the benefit obtained from the increased activity of the bacteria when the rains come, and, moreover, on such estates nitrogen is usually plentiful in the soil. Tea and Rubber, again, are usually grown in hilly districts and on sloping land, and the danger is that the monsoon rains will carry away the loose and partially sterilised top soil with its bacteria, and remove it from the sphere of influence of the crop.]

In pot experiments conducted in Germany it was found that the use of amounts of potash salts which may be employed in practice exerted an appreciable influence in reducing the amount of water taken up from the soil. The influence was more marked in the case of crude salts than in case of pure salts, due to the larger amounts used of the former.

—:o:—

In certain technical papers chemical studies of various samples of Thomas' slag are reported which "indicate that the basic lime in slag is not only a very variable quantity, but that it consists of lime in various forms of combination. A little of it is free caustic lime. The rest is in combination, such as silicates and basic phosphates. A part of this combined lime is readily liberated, and will probably readily act in the soil as a base. Other portions are only liberated with greater difficulty and slowly. As the conditions are very complex, it is impossible to draw any line and state an exact percentage of basic lime in slag except in terms of a strictly defined method of determining it."

The Planters' Chronicle.

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PRICE AS. 4.

THE U. P. A. S. I.

(INCORPORATED.)

The Scientific Officer.

Mr. R. D. Ansted was to leave Mundakayam this morning for Peermade, where he expects to remain till about the 9th instant, when he hopes to be present at a meeting of the Central Travancore Planters' Association.

"The Planters' Chronicle."

Some instances of wrong addressing of papers have been brought to notice. It would be a very great convenience if every recipient of the *Planters' Chronicle* would kindly note the form of address used and send a post-card to the Managing Editor informing him of any change that would be likely to conduce to prompt and regular delivery.

Another point calls for mention. Planters appear to think that when a copy of the paper goes astray in the post they are entitled to demand despatch of another copy. This is not the case, and while always willing to respond to calls of this kind to the best of his ability, the Managing Editor must point out that the supply of papers is limited and that he accepts no responsibility for non-delivery of copies posted.

Samples of Coffee Wanted.

Writing to the Secretary, U.P.A.S.I., under date 30th March, 1910, Mr. G. H. Krumbiegel, Economic Botanist, Superintendent of the Mysore Government Museum, remarks:—

"I have the honour to state that I want to improve the Economic Section of this Institution and to request therefore that you will be kind enough to intimate to the several Coffee Planters of this Province who are members of the U.P.A.S.I. to procure, direct to this Museum, different kinds of Coffee that can be obtainable from their plantations with information as to their different stages of preparation, value, etc."

Mr. Krumbiegel has been asked if he requires samples of Coffee only, and it has been suggested to him that a good plan would be to arrange for a comprehensive series of exhibits of planting products at the Mysore Industrial Exhibition, 1910, with a stipulation that all such exhibits be placed subsequently at the disposal of the Museum authorities at Bangalore.

Whatever the decision may be in regard to this, it is hoped that planters in Mysore will kindly do their utmost to furnish the Museum with representative specimen of Coffee and detailed information concerning them.

The attention of the North and South Mysore Planters' Associations is specially invited.

Scientific Officer's Papers.**XXIII.—HYBRIDISATION OF COFFEE.**

Several estates in Southern India possess hybrid coffee plants which combine more or less the characteristics of Liberian and Arabian.

In one or two places a certain amount of experimental work has been done in the propagation and improvement of these hybrids. For several reasons, however, this work has been desultory, and has unfortunately of late years, with one exception, been abandoned.

The benefit to be gained by cross-breeding in the production of new races and varieties of plants is well understood, and it is made use of to improve the yield of many cultivated crops.

The production of uniform races of crops adapted to special purposes is a very important problem for practical consideration. The lack of uniformity of the individual plants in the field is responsible for the low yield of inferior quality.

In the case of Coffee, I have it on good authority that 200 bushels of ripe cherry on an average give a ton. A bushel of ripe cherry on an average may be taken to hold about 15,000 berries. If there are 1,500 trees to the acre, 10 berries per tree would give 1 bushel per acre, or 2,000 berries a tree one ton. In other words, it is only necessary to pick about 100 berries from each tree on an acre to get 1 cwt. of coffee. This is of course only an approximate estimate, but it serves to show how much variation there must be between individual trees to produce the low yield which is usually obtained. The most valuable and important lines of plant breeding are those which aim at bringing up the average of the crops to that of the best individual plants.

For this reason alone more attention should be paid to the breeding of hybrids of coffee, but, in addition to this, the hybrids in existence show a marked power of resisting leaf disease and black rot, which is due to their increased vitality.

Improved quality of the bean is also an object to be aimed at in any system of coffee breeding.

The method is unpopular, no doubt on account of the time it takes to get the full advantage of any new hybrid, but, despite this, such magnificent results have been obtained with other crops, that I feel sure the future of coffee in Southern India should be developed along these lines, and increased yield, improved quality, and comparative immunity from disease gained by systematic breeding.

A number of different varieties of coffee have now been established in Southern India, and these should be systematically crossed to produce hybrids. In crossing, the object to be aimed at is to reproduce the desirable qualities of two distinct individuals in the body of a single individual. Two kinds of hybrid are most likely to prove useful, one is what is known as a "goneodinic" hybrid, *i. e.*, a hybrid in which the prevailing characters are more approximate to one parent than to the other; this can be arrived at by crossing a hybrid with one of the parent stocks. The other kind of hybrid, likely to be useful is what is known as a 'ternary' hybrid, *i. e.*, the indirect offspring of three different species.

Coffee is naturally fertilised largely by means of insects, and failing this, is self-fertilised. The difference between the fertilising work of insects and that of man is, that in the former case it is haphazard, and in the latter systematic.

The method of procedure for hand fertilisation was well described by J. Cameron, the late Superintendent of the Government Gardens in Mysore, and his description is reproduced below :—

“The bushes to be operated upon are carefully isolated. For this purpose a few skeleton frames covered with fine muslin are sufficient, if placed over the bushes before the flowers open. Where bushes are intended for hand-fertilisation, it will be necessary in the early stages of reproductive growth to rub off a great many flower buds, so that the inflorescence of an individual may be reduced to a manageable number of flowers. For that matter, the flowers could be reduced to what is borne on a single primary, or to a few clusters of the same. The necessity for this apparently ruthless treatment is contained in the fact that, during the short time the stigma is receptive of foreign pollen, the fertiliser could only pollinate a limited number of flowers with any degree of certainty. Let us now suppose that the operation is about to take place. Having provided himself with the marginally noted requisites, and selected a protected

A fine camel's-hair brush ;
small, sharp penknife ; small
sharp pair of scissors ;
pocket lens ; flowering
branch from male parent,
with pollen.

bush to become the seed-bearer, the fertiliser places himself under the protective frame and eagerly watches for the opening of the first flower. Directly the flower opens (usually early in the morning), there will be seen, slightly projecting from its delicate-white throat (tube of the corolla) a bifid or two-horned stigma supported by 5-7 arrow-headed anthers on short stalks. At the time of opening, the stigma, which is seen well in advance of the anthers, glistens with a sticky substance which holds fast any powdery matter, such as pollen, that may fall on to it. What the fertiliser has to do at this stage is to dust a little foreign pollen on to it by means of camel's-hair brush. This done, he instantly, and as deftly as possible, cuts away the 5-7 anthers behind the stigma. But as the anthers are usually closed at this early period, they could perhaps do no harm if they were left. Everything would depend on the behaviour, so to speak, of the stigma towards the new pollen by which it has been fertilised.

“The process as described above has to be done with every flower until the primary or clusters of flowers reserved for crossing have been exhausted. A register is then made of the parentage on both sides, and after a day or two the bush is liberated from its protecting covering.”

At Chundrapur Estate, the Hon'ble Mr. J. G. Hamilton has for many years carried out a system of experiments with hybrid coffee trees. The original hybrid possessed the vegetative vigour of the maternal plant, *Coffea Liberica*, with some of the productive quality of the paternal plant, *Coffea Arabica*. Seed from this hybrid was chosen and sown in nurseries and later planted out, giving a number of second generation hybrids ; seed from these supplied hybrids of the third generation, and so on, until a large number of hybrid plants of seven or eight successive generations have been obtained. These show, as would be expected, all sorts of types, and rigid selection of these has been adopted.

This system has given quite good results, but it is a more or less haphazard one, since the exact parentage of the selected seed is not known ; it may have been the result of self-fertilisation and of consequent inbreeding, or it may have been the result of cross-breeding from an unknown parent by means of insect visits.

With all this material to work upon there is an excellent opportunity for some systematic work, and with this object in view I paid a visit to

the estate from 3rd to 8th March to carry out some preliminary experiments in hand fertilisation. Two of the best hybrids were chosen, one a second generation plant and one a third generation, both of which showed the vegetative vigour of *Coffea Liberica* to a marked degree, but lacked the cropping quality of *Coffea Arabica*. To obtain this latter quality was our primary object, *i. e.*, to produce a goneodinic hybrid with the prevailing tendency to give the heavy yield of *Coffea Arabica*. A number of flowers (100 on one and 50 on the other) were crossed with pollen from a pure *Coffea Arabica*. The trees were made to flower at the same time by watering them.

A number of difficulties were encountered, the chief one being that of inducing the trees to flower at the same time, but a good many things were learned about the work in the course of the experiment which will be of great value next year, when it is hoped to carry forward the fertilisation several more steps.

When a really suitable hybrid has been produced the proper course is isolation under a net from all other varieties of Coffee with a view to inbreeding, and seed production, when the type will be reproduced in accordance with Mendel's Law.

RUDOLPH D. ANSTEAD, *Planting Expert.*

The Fertilising Influence of Sunlight.

In a letter to *Nature* (March 10, 1910) Mr. John Aitken, of Ardenlea, Falkirk, makes the following contribution to the discussion of the above subject :—

"The letters of Mr. and Mrs. Howard and of Dr. E. J. Russell in recent issues of *Nature* point to the conclusion that the partial sterilisation of the soil improves its fertility. In connection with this subject, I would like to record that the effect of heating the soil has been observed here for some years. It has been the practice to collect all the refuse of the place that cannot be rotted, such as hedge cuttings, tree prunings, etc. These are placed on a vacant space in the kitchen garden and a fire made of them in winter. The fire is generally a large one, burning fiercely all day, and the larger branches keeping it going all night.

"In the following summer the site of the fire is well marked. The rows of vegetables where they pass over it are more than a half stronger than at other parts, though they do not keep that proportion to the end of the season. The increased growth seems to be due to the heating of the soil, and not to the large amount of wood ashes left by the fire, as these are either lifted and used as a top dressing for borders where the spade cannot be used, or are spread over the vegetable ground, the site of the fire being generally left quite bare of ashes."

—:o:—

The four Dutch brokers issued their statement of the world's coffee production on February 19, their estimate being as follows :

Total crops—					Bags.
1908-1909	...	...	...	...	16,743,000
1909-1910	...	...	...	...	19,063,000
1910-1911	...	...	...	...	15,205,000

On February 28, 1910, the Visible Supply was, according to Messrs. Duuring and Zoon's calculations, 15,287,000 bags, against 14,894,000 at the corresponding date a year earlier, 16,060,000 in 1908, and 15,301,000 in 1907. At the opening of the 1909-10 season the Visible Supply was 12,835,000 bags, but the increase since then is small by comparison with that of over 5,500,000 bags recorded in part of the "bumper year," *i.e.*, between July 1, 1906, and February 28, 1907.

Notes and Comments by the Scientific Officer.

26. *Mole-cricket or Slug*?—Referring to Note 18 on Mole Crickets, Mr. E. E. Green, the Government Entomologist, Ceylon, kindly writes me as follows:—

"With reference to your note on Mole Crickets, it appears to me that the symptoms described are very suggestive of the work of the Slug *Mariaella dussumieri*, (vide "T. A.," August 1909 p. 136, also November 1909, p. 431, and February 1910, p. 120.) Your correspondent should keep his eyes open for this pest. It has been found in the West Indies also."

The following is a summary of the information contained in the above references to the *Tropical Agriculturist*.

The Slug is a new Rubber pest which creeps up the stems of the trees at night and eats the tips of the young shoots, thus doing a considerable amount of damage. It is particularly active in the wet weather. In the day time the slugs are said to retire into the grass or under the dead leaves on the ground. Several remedies are suggested. Cylinders of freshly tarred brown paper may be tied loosely round the base of each stem. "Vaporite" may be strewn over the surface of the ground round each tree, which would bar the passage of the slugs and be more effective than lime, the action of which would be destroyed by rain. Sliced yams, poisoned with a mixture of arsenic and sugar, would be an attractive bait.

27. *Basic Superphosphate*.—During my recent short visit to South Mysore I had the pleasure of meeting Mr. Bernard, of Messrs. Parry & Co., and of discussing with him the relations between his firm and planters, and the various requirements of the latter. Obviously it will be greatly to the benefit of planters if firms like Messrs. Parry & Co. keep in touch with the planters through the Planting Expert.

Among other matters discussed was that of Basic Superphosphate, which I think a more suitable fertiliser for light soils deficient in lime than acid phosphates like superphosphate, or slow acting ones like Basic Slag.

Mr. Bernard now writes as follows, "We are able to supply Basic Superphosphate containing about 35 per cent. of lime, and 12 per cent. of Phosphoric Acid soluble in Citric Acid as specified in your paper on 'Phosphatic Fertilisers'—in the *Planters' Chronicle*, p. 54 of the current volume. Its cost on rails Ranipet, about Rs.45-8-0 per ton, compares very favourably with Basic Slag. Planters can rely on having this Super in new gunnies, and up to weight, which does not always happen on bringing stuff out from home."

High grade Basic Slag contains about 13.5% citrate soluble Phosphoric Acid and costs something like Rs.70 per ton, and if the figures I quoted in the paper referred to in Mr. Bernard's letter are taken, the unit values for citrate soluble phosphoric acid work out at 3.2 annas per lb. for the Basic Slag and 2.5 annas per lb. for the Basic Superphosphate, indicating a saving of 8 pies per lb. of available phosphoric acid, which is probably in more suitable form in the basic superphosphate.

RUDOLPH D. ANSTEAD,
Planting Expert.

Owing to the difficulty of obtaining an adequate supply of labour at Heeleaka, the Indian Tea Association has decided to give up the experimental area of the Scientific Department there.

DISTRICT PLANTERS' ASSOCIATIONS.

Mundakayam Rubber Planters' Association.

*Minutes of Annual General Meeting held at Travellers' Bungalow,
Mundakayam, on March 8th, 1910.*

PRESENT :—Messrs. J. A. Richardson, (Chairman), R. Harley, G. Atkins, A. Hamond, H. C. Plowden, E. R. Gudgeon, and R. E. Haslam, (Honorary Secretary).

The Minutes of the last meeting were taken as read. The Report for year 1909 was read by the Chairman.

The Report.

Gentlemen,—Since our last Annual General Meeting, this district has made rapid strides towards the producing stage. A certain amount of rubber was harvested last year and has realised very satisfactory prices, and during 1910 there should be quite an appreciable quantity of Rubber harvested in Mundakayam.

I have not received any crop figures to go on, but from the Acreage Statistics I find that before the end of the present year there will be some 3,260 acres in tapping in Mundakayam.

6 year old Rubber	...	...	226 acres.
5 " " "	...	...	752 "
4 " " "	...	...	2,282 "
			3,260 "

It might interest you to know the various acreages and ages of Rubber throughout Travancore and Cochin taking the age as at next June or July which would be tappable at the end of this and beginning of 1911.

	7 years old.	6 years old.	5 years old.	4 years old.	Total
Travancore ...	242	671	1,906	4,488	7,307
Cochin ...	...	...	47	963	1,015
Total ...	242	671	1,953	5,456	8,322 acres.

So that in the near future Travancore is going to be an important factor in the Rubber world. Our climate, soil and lay of land are particularly well suited to the growth of Rubber, but I think our chief advantage is that we are not burdened with any over-capitalised companies—it may be because we were not in a position to demand the exorbitant prices that have been paid for Rubber elsewhere—so that when the price does fall, and we can hardly expect it to keep up to the present rate, we will be able to show very handsome dividends, which will be a reward for the modest profits we were content with in the first instance.

The Rubber industry in Travancore looks promising and is in a very sound position.

In touching on the work of the Association during the last year we have to thank Government for the new bridges at Kanjirapalli and the Kuttikal Road, which is practically completed.

Removal of Royal Trees.—This matter is still rather unsatisfactory, and as I stated last January the price per candy is much too high and the system of measuring is, I consider, hardly fair on the planter.

The Forest Department have not allowed for the fact that nearly all the teak and blackwood left is in more or less inaccessible land where the cost of transport makes the removal of it almost prohibitive, and I hope

Government will see the matter in this light and reduce the price to a more reasonable figure.

Jurisdiction Boundary.—In this matter Government has also met our wishes, and the Peermade Magistrate holds court at intervals in Mundakayam; but it would be a convenience if the Magistrate would advise us beforehand of his visits.

Liquor Shops in Vicinity of Estates.—Our suggestions in this matter have also been favourably received by Government.

Planters' Benevolent Fund.—This fund was inaugurated at the United Planters' Association Meeting last August, but I am sorry to say it has not received all the support it deserves. I should like to see more individual subscriptions, and I hope Proprietors and Companies will see their way to support it by subscribing for their estates as life members. It has been proposed that a list of contributions should be published in the *Chronicle*, so I trust members will send in their subscriptions to the Honorary Secretary at an early date and those who have not already subscribed will do so to enable the funds to be forwarded to the United Planters' Association as soon as possible.

European Doctor Scheme.—This scheme has been before us for some time now and a Joint Committee with Peermade was appointed, but I have not heard of any result. This is one of the most important matters that has come before the Association and one which wants the unanimous support of every Proprietor and Company in the District. I cannot imagine that any owner or Directors will withhold support to a scheme which so vitally affects the welfare of their coolies and superintendents, and should the scheme fall through from want of unanimous support, those who refuse it take an awful responsibility on their shoulders. With the large number of Europeans and the increasing number of ladies in the district, it is a scandal that we have not made any provision for medical aid in case of sickness.

It is going to cost us very little more than it does at present and we will have our hospitals properly run and Apothecaries supervised and, I am sure, save a considerable amount over the ordering of drugs, by which our labour will benefit. I trust, therefore, the Mundakayam members of the Medical Committee will set to work at once and get the necessary guarantees from Estates to subscribe for a period of 5 years and get the scheme put in force without further delay.

The suggestion in the first instance came from this Association, and nothing seems to have been done. Peermade, with the exception of, I think, one estate, is in favour of the scheme, and I feel sure in the case of this exception it only requires a better explanation to bring it into line with the rest. The matter is too urgent for delay, and I hope members will do all in their power to expedite matters, and make the work of the Committee as light as possible. I am afraid I have already trespassed too long on the time of the meeting, and in closing must thank you for the support you have given me as your Chairman during the past year and now beg to place my resignation in your hands.

Accounts for the Year 1909.—Proposed by Mr. Hamond and seconded by Mr. Atkins: that the accounts as laid on the table be adopted and passed. Carried unanimously.

The Scientific Officer.—With reference to Circular No. 9 from the Secretary U. P. A. S. I: "That this Association is of opinion that Mr. Anstead should first visit all the various planting districts in Southern India, after which we should be in a better position to consider the advisability of his visit to Ceylon."

Proposed by Mr. Harley and seconded by Mr. Atkins, and carried.

Lady Ampthill Nursing Institute.—Resolved that it be intimated to the Resident that the scheme is approved of and that subscription for 1910 will be sent in.

Planters' Benevolent Fund.—Resolved that the same subscriptions be levied as were promised at the last meeting.

Removal of Civil Court from Kanjirapalli to Meenachil.—"That this Association views with alarm the proposal to move the Civil Court from Kanjirapalli to Meenachil, which is 27 miles distant from Mundakayam and 44 from Peermaad. That we understand that the present removal of the Court from Kanjirapalli is the outcome of our agitation in the past and at that time Government promised to give us a Civil Court at Peermaad. This, Government seem to have lost sight of, in so much as they have fixed on Meenachil as the Civil Court centre, which will make civil process almost out of the question, as the roads in the district are in a bad state and the rivers unbridged, besides which there being no rest house at Meenachil where Europeans can put up."

Proposed by Mr. Harley and seconded by Mr. Hamond.

Resolved that future meetings of the Association be fixed in advance, and that the next one be held at the Travellers' Bungalow, Mundakayam, on April 30th.

Penang and Malacca Recruiting Agents.—Resolved that the Secretary forward a copy of the notice being circulated amongst our coolies by the Penang and Malacca Recruiting Agents and ask the U. P. A. S. I. to take action and put a stop to the practice.

Roads.—

i. *Kanjirapalli-Eratupettah Road.*—Resolved that this Association begs to draw the attention of Government to the very bad state of the two bridges at the Kanjirapalli end of the road.

ii. *Palai-Eratupettah Road.*—Resolved that this Associations draw the attention of Government to the Executive Engineers (Kottayam division) letter No. 1270, dated 14-10-09 and would point out that nothing has been done towards re-erecting the two bridges.

Proposed from the Chair.—"That Mr. Anstead be elected an honorary member of the Association." Carried unanimously.

The retiring Chairman and Honorary Secretary were thanked for their services during the past year.

Election of office-bearers.

Chairman	... J. J. Murphy.
Hon. Secretary	... J. R. Vincent.
Committee	... J. A. Richardson, R. Harley and G. H. Danvers-Davy.

With a vote of thanks to the Chair the meeting terminated.

(Signed). R. E. HASLAM,
Honorary Secretary.

TEA.**The Tea Trade.**

Prices of the lower grades of leaf tea have been slowly tending dearer for some weeks past, notwithstanding that the stock of all kinds of tea remaining in the bonded warehouses of the United Kingdom at the end of January was larger than in the corresponding period of last year, *viz.*, 134,441,000lbs., against 128,813,000lbs. in 1909 and 131,814,000lbs. in 1908. The quotation for fair common Indian Pekoe Souchong is 6½d., there being only a small quantity of commonest leaf at 6½d., and under 7d. the tendency of prices is to harden. Common Ceylon is rather dearer than India, the supply being small, only a very limited amount being obtained at 6½d. for clean common Pekoe Souchong, while in some instances 7d. is readily paid, which is the lowest price ruling for Pekoes, with the exception of occasional lots selling at 6½d. At present the value of common leaf tea is about 1½d. per lb. dearer than at this time last, and most indications go to show that there is no probability of any modification of present values, but rather an accentuation, which will probably be experienced during the next few months, chiefly for grades below 8d. per lb.

The world's production of tea scarcely keeps pace with consumption, and any enhancement in values therefore comes as no surprise. The total imports of tea into the United Kingdom during 1909 amounted to 341,714,358lbs., in contrast with 323,469,333lbs. in 1908 and 317,127,053lbs. in 1907. Home consumption last year totalled 283,549,487 lbs., against 275,418,106 lbs. in 1908 and 273,995,929 lbs. in 1907. The falling off in exports from this country during 1908 was more than recovered in 1909, mainly owing to the increased quantities sent to Russia. Total exports from the United Kingdom in 1909 were 51,867,953lbs., against 41,585,565lbs. in the previous year and 46,374,518 lbs. in 1907. The increase in the Indian output for the season now drawing to a conclusion is estimated at near about 12,000,000lbs. So far, according to the latest returns, 173,095,000lbs. have already been shipped from Calcutta and Chittagong to this country since April 1 last, as opposed to 165,146,000lbs. sent in 1908-9. Exports from Ceylon have also shown material expansion, equalling to this country nearly 10,000,000lbs. increase last year.

Unfortunately the further debasement of the tea trade is threatened by the tactics adopted in certain quarters. For months past the public have been made familiar with misleading references to "finest tea at ls. 4d. per lb.," and the demand for cheap, inferior teas has been assiduously cultivated, as far as possible to the detriment, temporary at least, of the tea trade as a whole. Efforts ought to be directed to elevating instead of debasing the public taste for tea, yet we find the prevailing craze for cheapness irrespective of quality, is being encouraged and catered for without any thought of the future of the trade. Quite recently one of the largest of the multiple-shop companies has announced "a reduction of price" to the extent of twopence per pound on all its teas. The general public are not acquainted with the course of the markets, and believe that a "reduction in price" is justified by decreased quotations in Mincing-lane; and many grocers have been harassed by demands from their customers for an equivalent reduction in the prices of their better-class teas. Being unwilling to sacrifice quality for price they have been compelled to refuse the requests, and in many instances difficulties have arisen in consequence. The Fine Tea Fund Committee might usefully consider what action they can take to demonstrate to the general public what the "reduction in price" referred to really means.—*Grocer*. February 26, 1910.

SELECTED CUTTINGS.

The Balance of Life in the Soil.

I. GENERAL CONSIDERATIONS.

A generation has passed since it was discovered that one of the chief causes of fertility in the soil, namely the formation of nitrates, is the outcome of a vital process, and this discovery was the beginning of investigations which have led gradually to a recognition of the importance to the agriculturist of the minute living beings which inhabit the soil. As long as the soil was regarded merely as a medium which provided water, air, support and a certain amount of chemically produced food for the roots of the plants which flourished in it, so long did experiments, which had been devised for the purpose of determining the conditions under which the soil would best fulfil the purpose of producing good plants in profitable quantities, give results which were in conflict with the expectations derived from the theories of the time. It is only since the recognition of the soil as the home of countless, quickly living beings that an adequate means of explaining the behaviour of plants in it, under varying conditions, has been supplied. Even now, there is much to be done, for investigations in connexion with such a complex of living and dead matter in speedy change as exists in the soil require time and much taking of pains before explanation and practical application of their results can be reached.

The great bulk of the soil is composed of particles, large and small, which owing to their shapes cannot completely fill the space, so that the interstices between them provide room for air and water, while their surfaces also supply a means of holding this liquid, and are inhabited by the minute living beings to which special attention is being given at present. Of the particles themselves, those which are composed of mineral matter undergo change which is comparatively slow; those which are organic in nature, however, alter quickly, especially at the temperature of the tropics, some of the changes being chemical in nature, while others are the outcome of the activity of the living organisms. In comparing the direct importance to the agriculturists of these two kinds of particles, that of the former must not be underrated, in view of their use as a source of slowly available plant food and of the fact that it is their nature which often helps to determine the amount of acidity or alkalinity of the soil.

A careful consideration of the history of a given area of soil makes it evident that it is in a constant state of change. In some respects it is undergoing a loss of actual matter, in others a gain of material is being made. As regards the first, water is always leaving it, through evaporation and transpiration by plants, as well as through drainage and percolation, the latter circumstances leading to a loss of soluble matter, in addition, while where the rainfall is heavy there is a likelihood of a loss of bulk taking place through the washing away of the smaller, lighter particles. To these more mechanical causes of loss are added those of the action of denitrifying and, in many cases, putrefactive organisms, whereby nitrogen, carbon, oxygen and hydrogen are removed. Loss also takes place to a certain extent by the removal of such parts of plants as are carried away by the wind or by animals: by the former in connexion with the distribution of seed, and by the latter through accident, or purposely, for the provision of food, clothing, etc.

Considering again a definite area of soil, one of the chief sources of addition is, of course, the water which falls as rain, bringing with it the gases which it has dissolved during its journey through the atmosphere;

through the air also arrive particles of matter and portions of plants which have been carried by the wind from other areas of soil. From below, it receives increments of matter by the weathering of the subsoil and underlying rocks. The carbon and much of the oxygen which are supplied in the remains of the plants that have lived and died upon it are an addition from the air. Nitrogen is added by the nitrogen-fixing bacteria and by those which live in symbiosis with leguminous plants. Lastly, matter is added to the soil by the animals, either accidentally, or (as in the case of man) for the purpose of increasing the yield of the crops which grow on it.

An appreciation of these facts will lead to an understanding of the phenomena which are exhibited by the soil when it is subjected to different kinds of treatment. One of these, which has lately aroused particular interest, is sterilization, whereby the soil is placed under such conditions that the forms of life in it are partially or completely destroyed; it is now proposed to give more definite attention to this. A first effect of sterilization to be noticed was the increased fertility of the soil which followed it—a circumstance originally observed by Oberlin, when using carbon disulphide as a remedy against the phylloxera of the grape. Since then, investigations have been conducted with other sterilizing agents such as benzene, ether, chloroform, toluene and phenol, as well as in experiments where heat was employed; in the last connexion, Russell and Darbishire, in England, carried out an exhaustive series of trials by which they showed that heated soil will produce a yield twice as great as that from unheated soils, and that the effect of the heating will declare itself during four subsequent crops. Without such researches, the broad fact that soil which has been heated gives larger crops has long been evident to those who have observed plants growing on the sites where weeds have been burnt, or where charcoal pits have been made. It is not, however, a simple matter to provide an adequate explanation of the circumstance.

In the attempt to do this, various theories have been put forward; they may be divided into those which advance direct action of the disinfecting influence on the soil as the cause of the phenomenon, and those which attempt to explain it through its effect on the organisms in it. In the first division are included those of Moritz and Scharpe, and Pickering. The former endeavour to explain the action of carbon disulphide, in the connexion, by stating that this substance becomes changed into bodies suitable for plant food in the soil—an occurrence which is very unlikely to take place, in consideration of the stability of that compound and of the small likelihood that it can be decomposed by bacteria. Pickering only goes as far as to draw a comparison between the action of disinfectants and that of heat in increasing the amount of the soluble organic matter in the soil.

Other explanations, as has been stated, have for their basis the alteration of the conditions in the soil as regards the micro-organisms which it contains. Hiltner and Stormer arrived at the conclusion that partial disinfection of the soil upsets the balance of bacterial life in it, with the effect that improved conditions arise on account of the resulting increase in numbers of the beneficial varieties of bacteria. Koch has suggested that the change is due to stimulation of bacterial growth, in the case of disinfectants, by the traces of those bodies which remain in the soil after their use, basing his theory on the well-known fact that poisonous compounds, in small quantities, often act as stimulants. Lew explains that, as the walls of dead cells permit the passage of all kinds of dissolved matter, owing to the destruction of the lining of protoplasm, the contents of the dead organisms pass out into the soil, thus enriching it chiefly with nitrogenous compounds and potassium phosphate, the process

being aided by the property possessed by certain bacteria of producing enzymes (ferments) which can dissolve the remains of those organisms. It is difficult to see, however, how sufficient plant food could be added to the soil, in this way, to account for the extent to which its fertility has been changed.

The latest attempt at explanation of the effect of the partial sterilization of soils also belongs to the category in which account is taken of the action of the disinfecting material or influence in altering the conditions under which micro-organisms exist in them. It has been made by Russell and Hutchinson, of the Rothamsted laboratories, and like that of Hiltner and Stormer, it has for its basis the effect of the change which takes place in the balance of life in the soil, but in a different way. As, however, in view of its interest and importance, it deserves discussion at some length, its consideration is deferred for the next number of the *Agricultural News*.—*The Agricultural News*.

Coffee and Tea in Russia.

Consul-General John H. Snodgrass furnishes the following report, in reply to an inquiry :—

The population of Russia in 1897, the last census, was estimated at 152,009,300, and Moscow is said to have reached 1,500,000. With such an enormous population, both general and local, the demands for such luxuries as coffee and its substitutes would seem to be great, but on account of the high price of these articles the average Russian who is not addicted to the use of alcohol in the form of vodka drinks tea, as a rule, not only because it has been established for decades as the national beverage, but because it is comparatively cheap and appears to supply the wants of the individual. Coffee, chocolate, cocoa and coffee substitutes are used only by the richer classes which compose the minority of the population.

The imports of these various articles of consumption in 1908 were as follows : Tea, \$14,811,400 ; coffee, \$4,272,370, chocolate, \$541,780 ; total \$19,606,550.

It is therefore manifest that in the neighbourhood of \$20,000,000 is spent annually by the Russian people for tea, coffee and their substitutes, seven-tenths of which go for tea. Tea is produced in the Caucasus, but there are no statistics available showing the extent of the production.

The average price of tea is from 72 cents. to \$1.13 per pound ; the duty is \$16.22 per 36 pounds ; pressed brick tea is taxed by duty much less, being only \$5.79 per 36 pounds.

The high price of coffee has prevented, in a great measure, its increased national consumption, it being generally recognised that it would be a most popular number on the restaurant bills of fare and in the people's home were it more reasonable in price. As compared with its use in the United States coffee is little known here. Two-thirds of all the coffee imported comes from Brazil, the next in order being imports from Costa Rica and Ceylon. Mocha, Java, Cuban, Martinique and Ceylon coffees sell, raw, at 55, 40, 35, 30 and 25 cents per pound, and roasted at 60, 45, 40, 35 and 30 cents per pound respectively.

Ordinarily good coffee, roasted, sells at 40 to 50 cents per pound. These are retail prices, the wholesale prices are from 5 to 10 cents less.

The customs import duty on coffee is as follows per pood (36 pounds) : Raw \$3.01 ; roasted, \$4.64 ; coffee substitutes, \$4.64.

There are no conventional rates of duty on coffee, nor are there any national taxes, imposts, or excises on coffee as an article of commerce ; neither do octroi and similar local duties upon its introduction apply to coffee, nor are there any industrial taxes in Russia upon the business of preparing and selling it.—*American Grocer*.

The Planters' Chronicle.

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The Scientific Officer.

It is probable that Mr. Anstead will leave Peermade to-morrow or on the 11th instant, and be back here about the middle of the month. In all probability, he will visit the Nilgiris soon after that, but no definite plan has been arranged up to the present time.

Samples of Coffee Wanted.

In continuation of what was written under the above head in last week's number, it may be stated that Mr. Krumbiegel, Economic Botanist to the Government of Mysore, has expressed approval of the suggestion that Mysore planters should first make a good display at the Mysore Industrial Exhibition of 1910 and then let the exhibits go to the Museum at Bangalore as samples.

Mr. Krumbiegel considers the idea of making a combined Special Exhibit on behalf of planters at the coming Exhibition an excellent one. He is President of the Exhibition Committee and is, in that capacity, ready to do all he can to make a "Planters' Pavilion" a striking and successful feature. He remarks that "the exhibition and attractive staging of all planting produce is undoubtedly very important to the Planters, not only as a means to bring their produce to the knowledge of prospective local buyers, but as a general advertisement." He has the permission of Government to illustrate future Reports issued by his Department, and he hopes the report on the next Exhibition will also be illustrated "and serve as an outside advertising medium to prominent exhibitors." Then, when the exhibits were transferred to the Museum the Economic section of the Museum "could be a permanent Exhibition of Mysore planting produce."

To this may be added the remark that at the Exhibition at Mysore this year there might, and indeed should, be something more than a collection of the planting products of *Mysore State* alone. Last year, there were some good specimens of Rubber from South India, also a few samples of Tea. The latter, more particularly, were not "displayed" at all, they were merely stuck on tables in such a way that there was little chance of their attracting general notice.

What is now advocated is the opening of a separate stall—or, preferably, a Pavilion—for the display of *all* planting products of South India; the distribution of free samples, in some cases, from this Pavilion; the sale of small cheap packets in other instances, if planters can be induced to provide supplies. All with the view to arousing interest in the Planting Industry and indirectly doing something towards popularising both Tea and Coffee as beverages for use in India.

Much must depend on the extent of the support given by planters; and it is hoped that many of them will promptly promise help.

Scientific Officer's Papers.**XXIV—MENDEL'S LAW.**

The problem of breeding plants so as to improve the type and fix desirable characters in them is one of great interest and importance.

This problem was at one time attacked by a method of selection only, and nothing was known of the principles which determine the results of hybridisation until Gregor Mendel, an Austrian monk, worked them out, some fifty years ago, by researches on Peas. From the results he obtained he enunciated a theory of heredity, which is usually known as "Mendel's Law."

Briefly, this law may be stated thus :—When pure strains, or stocks, are crossed, it is found that a certain list of qualities remain, so to speak, indelible, and appear uncontaminated in a definite proportion of the offspring of all generations after the first.

An example will make this clear. Suppose a tall variety of Pea is crossed with a short variety. It will be found that the plants of the first generation, *i. e.*, the plants which grow from the seed of the crossed flowers, are all tall. Tallness in this case is the dominant quality over shortness, which latter is called the recessive quality. Now when these tall first generation plants are crossed, the resulting seed produces second generation plants, which are both tall and short, but just one quarter are pure tall ; not only are they tall but they will remain tall when self-fertilised, or crossed with one another, and never revert again to short. Of the remainder a quarter will in the same way be pure short. The remaining half will be impure, but when again crossed to produce third generation plants, a quarter of these will again be pure tall, a quarter pure short and a half mongrels, and so on. Of the grandparents of a cross, one quarter will be pure reproductions in one quality of one grandparent, and another quarter will be pure reproductions in one quality of the other grandparent, and one half, though resembling one or other grandparent, will have latent in them the qualities of both.

The law in many of its workings is very difficult to follow, but in the hands of Cambridge biologists it has led to plain results. For instance, wheat has been found to be endowed to a remarkable extent with Mendelian characteristics. The strength of the straw, the length of the ear, the quality of the grain, and the resistance to disease, all obey the law, and the consequence is that a wheat can be made to order for particular purposes, and it is certain to keep true.

The case is not always so simple as in the example taken above ; usually the original parents vary in a large number of qualities, and in such cases each pair of characters in which they differ is transmitted according to the law, and often independently of any other pair.

Thus suppose in our example the original parent Peas besides being tall and short, had in the one case white flowers and in the other coloured ones. If now a tall plant with white flowers is crossed with a short plant with coloured flowers the first generation plants will all be tall and will all have coloured flowers. When these are crossed again the second generation plants will be both tall and short, according to the Mendelian rule, and out of every 16 plants, 12 will be tall and 4 short. The colour character will be transmitted in the same way but independently of tallness and shortness and it will be distributed equally among the tall and short plants. There will therefore be three with coloured flowers to one with white flowers among the tall hybrids, and three with coloured flowers to one with white flowers among the short hybrids.

The result is that a combination of characters has been obtained, and two new Pea plants now exist, coloured tall plants and white dwarf plants. According to the law, a certain definite proportion of these are pure and fixed, and by picking out such plants these new varieties may be established.

The chief difficulty in this work lies in determining what are the Mendelian characters of any given plant.

In the case of Coffee, for instance, this will be a lengthy and tedious process. Repeated crossing with intelligent interpretation of the results and rigid selection is the way to approach this difficulty.

The desirable qualities in the plant may be either dominant or recessive, but the latter case is in no way inferior to the former, the terms only relate to the first generation of hybrids, where certain characteristics disappear for the time being and so are termed recessive. The recessive characteristic reappears in plants of the second generation and if it is desirable quality these can be selected and fixed.

RUDOLPH D. ANSTEAD, *Planting Expert.*

—:O:—

Sugar In Bordeaux Mixture.

The *Experiment Station Record*, Vol. XXI, p. 151 contains abstracts of two papers on the making of Bordeaux mixture. In one of these, it is recommended that the copper sulphate solution be gently poured into the milk of lime, as this causes settling to take place much more slowly than when the mixture is made in any other way. It is further stated that the addition of sugar has a similar result, so that when stock solutions are used, it is of distinct advantage to employ that substance. The other paper deals with investigations in which varying quantities of sugar were added to the mixture, in glass cylinders, the amount of precipitation in the latter being afterwards measured day by day, when it was found that the rate at which the sediment collected was greatly lessened by the addition of sugar.

A further development of the idea is contained in an article in the *Cuba Review* for November last, which is as follows:—

"Cucasa," a soluble saccharate of copper with lime, is said to be coming into use in Europe in place of Bordeaux mixture. The new product yields a solution of copper that has all the fungicidal properties of Bordeaux mixture, but with the added advantages, it is claimed, of affording a clear solution in any dilution, and of keeping comparatively long. Being clear, it does not clog the nozzle of the spraying machine; furthermore, much less of it need be used than of the Bordeaux mixture. It is also uniformly alkaline, and there can be therefore no copper sulphate present to injure the foliage.

When sprayed on the trees, the thin layer of the solution is readily changed by the atmosphere, as in the case of Bordeaux mixture, into the insoluble film of copper compound that has the specific power to kill fungi. This film, owing to its thinness, has the advantage of interfering all the less with the important functions of the foliage, and also of sticking very close—a property which was found in one case to last for three months, after one spraying. Cucasa consists of molecular proportions of copper sulphate, slaked lime and cane sugar, thus being distinguished from other copper and sugar solutions by the proportions in which the constituents are present in order to produce a clear, alkaline, fungicidal solution. Its inventor is Dr. C. Rumm, of Stuttgart, Germany.—*The Agricultural News.*

Notes and Comments by the Scientific Officer.

28. *Diseases of Para Rubber*.—Specimens of diseased rubber branches have been received attacked by both "Pink Disease," and "Die Back."

The former is due to a fungus known as *Corticium javanicum*, about which a great deal has been published. A cracking of the bark showing a pink incrustation is the usual symptom.

The latter is due primarily to a microscopic fungus called *Glocosporium alborubrum*, which is followed very often by another fungus, *Botryodiplodia theobromæ*. The attack usually begins at about the middle of the length of the leading shoots, where it forms a dark brown patch which spreads up and down the shoot.

In both cases the diseased parts should be cut out and burned, and the cuts should be carefully tarred.

An excellent account of these diseases, written by Mr. T. Petch, the Ceylon Government Mycologist, will be found in Circulars No. 21 and 23 of Volume IV published by the Royal Botanic Gardens, and these should be in the hands of all rubber planters.

29. *Dragon Flies*.—I was recently informed that Dragon Flies had been doing damage by eating the young tips of Hevea shoots. That Dragon Flies eat any part of a plant is an entirely erroneous idea. Their food consists of the small insects of which there are so many always flying about, and this is what they are after when they are seen hawking about all day. They occasionally settle on a twig for a rest, but when in this position are not feeding. That the Hevea shoots in question had been damaged is undeniable, but the damage was done probably by some form of aphid or blight, though this could not be found, and it is more than probable that the Dragon Flies were feeding on the blight.

The larvae of the Dragon Fly are grub-like insects with large heads and formidable jaws, and are found in ponds and streams. These grubs feed voraciously on small water insects.

30. *An Inch of Rain*.—Few people, when speaking of the rainfall, pause to think what an inch of rain means exactly. An acre is 6,272,640 square inches. An inch of rain will cover this an inch deep all over, i.e., will be a volume of 6,272,640 cubic inches, which at 231 cubic inches to the gallon is equivalent to 27,154 gallons. This volume of water weighs 228,190 lbs. or 114 tons. Thus one hundredth of an inch of rain is over a ton of water to the acre, and when this is realised it is not difficult to understand why it is that often a very light shower does such lot of good and makes such a lot of difference to a growing crop.

RUDOLPH D. ANSTEAD, *Planting Expert*.

Planters in London, as well as their rubber shares, are now at a premium, writes the correspondent of the *Times of Ceylon*. "It was not always so, and the City man had rather a poor opinion of the bucolic individual from Ceylon who had no business training. The boot is now on the other leg, however, and the services of the planter are much in request for the front page of prospectuses. Never a week passes now, but I am asked to recommend a planter 'to make up our Board.' Anyone with planting experience and who was not too particular about the calibre of his companies might sit on Boards every day of the week."

DISTRICT PLANTERS' ASSOCIATIONS.**South Mysore Planters' Association.**

*46th Annual General Meeting of the South Mysore Planters' Association
held at the Munzerabad Club, Saklaspur, on Monday,
the 28th March 1910.*

PRESENT:—Mr. W. L. Crawford, President, Messrs. Graham Anderson, C. I. E., T. Anderson, J. G. H. Crawford, C. Lake, E. M. Playfair, C. K. Pittock and S. Sladden.

After the reading of the notice calling the Meeting, the minutes of the previous Special General Meeting held on the 16th of December 1909 were confirmed, and the agenda was proceeded with.

President's Address:—Gentlemen: Seeing we have a lengthy agenda to get through this afternoon, I don't propose taking up your time with a long address but briefly to allude to some of the more important subjects dealt with by the Association during the past year.

You are aware of the unfortunate illness resulting in the departure to Europe of our Hony. Secretary, Mr. R. F. Lamb, and I feel sure we all hope he may shortly return to India restored to health. In losing his services the Association has lost a member who was keenly interested in Association matters and planting affairs in general.

Owing to the Hony. Secretary's illness, his duties fell upon me, and I must ask your indulgence for the very imperfect manner I carried out the work. I freely admit my many shortcomings and plead that for various reasons I have had an extra amount of work devolving upon me during the past year, and I simply had not the time to look after your interests in the thorough way they should be attended to. I tried to keep things going and I hope in a measure at least I have succeeded in doing so.

This Association has now been in existence 46 years and during that time it has been instrumental in bringing about many reforms and improvements in matters connected with our industry and it is interesting to know we have even now quite a large percentage of the original members of the Association on our rolls, who take a lively interest in the affairs of the Association either directly or indirectly, and it is still more satisfactory to know that many Estates then represented are so now and are still in a most flourishing condition and if anything are yielding larger crops now than 50 or in some cases 60 years back. This is, I feel sure you will all admit, a matter for congratulation and goes to prove that Mysore is one of the few places in India well suited for the cultivation of coffee as a permanent industry.

Your Association have to express regret and disappointment that they have not yet been able to meet the North Mysore Planters' Association to discuss Act I of 1903 with them, so as to endeavour to arrive at some arrangement mutually satisfactory to both Associations, as it is most desirable that the whole planting community of Mysore should be of one mind regarding the most important matter of labour, and the sooner we can arrive at an understanding as to what each Association actually requires, the better it will be for us.

This Association is keenly interested in the popularization of Coffee, and I am glad to say I have only had one objection from the whole of the European Planters in South Mysore to the proposed export cess, the funds so raised to be used for pushing the sale of coffee, and the Native Planters'

Association had a large meeting in Saklaspur and have most cordially joined this Association in support of the scheme, and it will now be largely our own fault if we cannot bring about the proposed export cess for popularising Coffee and pushing its sale as suggested by the London Chamber of Commerce.

It gives the members of this Association very great pleasure to welcome Mr. R. D. Anstead, the Scientific Officer, to Mysore, especially so as they feel they are probably more interested in him and his work than any other Association in South India, as his appointment is the direct outcome of the sustained agitation maintained by them in 1904-1905 and 1906, showing the very great need there was for scientific advice to assist the Planting Industries of Southern India.

In Mr. R. D. Anstead we have a very practical expert who combining a highly scientific training with shrewd common sense is certain to be of the greatest assistance to us. I might mention, I have already heard one Planter say that by taking Mr. Anstead's advice on a matter of cultivation he had made a direct saving of over a thousand rupees in the past season's work, and that his property in no way suffered by the economy. Well, gentlemen, if we all seek the Planting Expert's advice and are as fortunate in the results, we will have still greater cause to express our gratification to the United Planters' Association and the various Governments concerned for their sympathy and practical assistance in arranging for this addition to the Imperial Agricultural Department of India.

I think it should not be lost sight of that this Association in particular owes a debt of gratitude to Messrs. Fletcher Norton, J. A. Harris and C. K. Pittock, who did so much to bring about the appointment of a Scientific Officer for the Planter Community.

I would invite your notice to the Planters' Benevolent Fund, which is now well started, and I would ask you to support it to the best of your ability, as you may be perfectly sure the money will be only used to help those in real need.

The past season has been a fairly good one, and it would seem to those of us who have studied the matter that we are at last emerging from the depression the industry has been labouring under owing to the great fall in prices for some years past. It seems to me that there is a distinct revival in the industry noticeable on all sides, and that prices are slowly but surely returning to that much to be desired high level that we enjoyed ten years ago. I am sure we all of us hope that this good time is not far distant, and that when it comes it will be to stay for a long time.

In conclusion, gentlemen, I would suggest you appoint a Committee to study the financial position of the South Mysore Planters' Association and endeavour to put the same on a better and sounder business footing, as I think the funds of the Association can be largely augmented with no hardship to the members. This improvement, if made, will make it much easier for the Executive to meet the growing expenditure of your Association. I am deeply sensible of the honour you conferred on me in electing me your President for the past year and I thank you for all your kindness to me during my year of office.

I do not seek re-election on the Executive, as I hope to go Home shortly for several months' holiday.

Audit of Accounts.—Messrs. C. Lake and C. K. Pittock were appointed auditors.

Act I of 1903.—The President informed the meeting that with regard to one of the questions raised, the legal opinion consulted had given it that

an European Planter has the option of being tried by a Justice of the Peace. The other question had not yet been replied to by the Government of Mysore.

The following resolution was then proposed by Mr. J. G. H. Crawford, seconded by Mr. C. K. Pittock, and carried unanimously :—

That further discussion be postponed until after the meeting of our delegates with those of the N. M. P. A. has taken place.

Coffee Export Cess.—The President intimated that he had circulated Post Cards and with one exception all the replies had been favourable to the cess, and that he had been present at a meeting of the South Mysore Native Planters' Association held on the 20th of February and all those who attended the same had voted strongly in its favour.

The following two resolutions were proposed by Mr. C. Lake, seconded by Mr. C. K. Pittock, and carried :—

"That the Native Planters' Association be requested to kindly forward their resolution on the above either to our Association or to the Secretary of the U. P. A. S. I."

"That the Secretary of the U. P. A. S. I. be written to requesting him to kindly ascertain what progress has been made in the matter of the Scheme for the Popularisation of Coffee by the London Chamber of Commerce."

Scientific Officer.—It was unanimously resolved :—That Mr. R. D. Anstead be elected as an Honorary Member of this Association.

Proposed by Mr. W. L. Crawford and seconded by Mr. T. Anderson and carried :—

"That the Secretary of the U. P. A. S. I. be written to to ask what programme of tours has been arranged for the Scientific Officer during the present season, as it is necessary for this Association to arrange a local programme so that as many members as possible may benefit by his visit."

Planters' Benevolent Fund.—Mr. J. G. H. Crawford intimated that this Fund would shortly be receiving from Rs.200 to Rs.250 from the Rev. Mr. Goodwill, Bangalore, from the balance of the fund that was recently raised on behalf of a Planter's Widow in our district.

S. M. P. A. Funds.—Proposed by Mr. J. G. H. Crawford and seconded by Mr. E. M. Playfair and carried :—

"That a small Committee consisting of Messrs. J. A. Harris, C. K. Pittock and T. Anderson be appointed to go into the finances of the Association and obtain fresh information bringing the book of rules, list of Members, with the acreage each represents, up to date.

Medical.—The President then read a Petition to Government for the Establishment of a Dispensary at Chickenhully from the people living in the neighbourhood and signed also by four members of the Association resident in the neighbourhood of that place, and said that he had given it the support of the Association at the request of one of the abovementioned members.

Mr. E. M. Playfair pointed out that Chickenhully was not the best centre from many points of view and that he was of opinion that all would be equally well served if the proposed Dispensary were located at Gonebid, which was more central, and he proposed the following resolution, which was seconded by Mr. J. G. H. Crawford and carried :—

"That the Dispensary if granted, be situated at Gonebid, as this place is more central and would serve other Estates and a large rural population

which would not be benefited if the Dispensary was opened at Chickenhully.

Forest Department.—Proposed by Mr. G. Anderson, seconded by Mr. J. G. H. Crawford and carried :—

“That the Forest Department be asked to open a dépôt for the sale of bamboos etc. at Saklaspur.”

Executive.—On a ballot being taken the following members were elected as Office-bearers for the ensuing year :—

President ... Mr. J. G. H. Crawford.

Hony. Secretary ... Mr. C. K. Pittock.

Committee:—Messrs. J. A. Harris, the Hon. Mr. J. G. Hamilton, C. Lake, T. Anderson, F. M. Hamilton and J. Aird.

The meeting then closed with a vote of thanks to the Chair.

North Mysore Planters' Association.

Proceedings of the Annual General Meeting held at Balehonur on March 11th, 1910.

PRESENT:—Messrs. C. H. Browne (President), E. N. Leslie, E. C. Bolton, F. W. Hight, C. P. Reed, C. S. Crawford, C. Danvers, E. H. Young, H. G. Bonner, L. P. Kent, H. H. Stephenson, A. F. Evetts, and R. G. Foster (Hony. Secy.). By proxy—Mr. S. L. Mathias.

Visitor:—Mr. Darkin.

Hony. Secretary's Report.—The Honorary Secretary's report was taken as read and accounts passed.

President's Address.—The President briefly addressed the meeting on the various points of interest.

Election of Office-bearers.—The following were elected :—Messrs. C. P. Reed (President), C. Danvers (Vice-President), A. F. Evetts (Hony. Secretary).

Honorary Member.—The Scientific Officer, Mr. R. D. Anstead, was unanimously elected an Honorary Member.

S. I. Planters' Benevolent Fund.—In addition to the sum of Rs.250, subscribed by the Association, the Honorary Secretary announced that Mr. C. Courpalais had subscribed Rs.200, and become a Patron.

Messrs. T. H. Allan and Co. had given a donation of Rs.100. A subscription list circulated amongst those present resulted in an annual subscription of Rs.135 being promised.

It is hoped that those members who were not present at the meeting will also subscribe to so worthy an institution.

Resolved :—“That the Honorary Secretary do write to Mr. C. Courpalais and to Messrs T. H. Allan and Co., thanking them for their generous donations to the Fund.”

Green Bug.—Proposed by Mr. L. P. Kent and seconded by Mr. H. G. Bonner :—“That in view of the havoc being wrought on the Pulney, Nilgherry and Shevaroy hills by the attacking of Coffee by the scale pest *Lecanium Viride*, the Scientific Officer be requested, by the N. M. P. A., to kindly issue and circulate through the '*Planters Chronicle*' an article, couched in the simplest wording, fully descriptive of the said bug and its

appearance upon shade and coffee which will enable the practical planter to at once identify it on its first arrival in our district, and distinguish between it and the lesser pests *Lecanium Imbricans* and *Pulvinaria Psidii*, which most of us have with us and do not much fear on account of their confining their attacks to shade trees; with a view to immediate and effective action being taken for extermination at the onset, while only, it appears possible."—Carried unanimously.

Roads.—The Association notes with approval the building of the Mussiry Hulla and Ton Niru Hulla bridges.

Travellers' Bungalows.—Resolved:—"That Government be requested to re-appoint Mateys to the Koppa and Yedehalli Travellers Bungalows."

Excise.—Read letter from Mr. A. F. Evetts, dated March 12th, 1910. Resolved:—"That in consequence of the drunkenness, rowdyism and gambling at the Aliegebyle liquor shops and its proximity to numerous estates, Government be requested to close or remove them."

New Rules.—The rules as amended were read together with a letter from Mr. S. L. Mathias suggesting several alterations. Proposed by Mr. E. C. Bolton, and seconded by Mr. H. G. Bonner: "That the rules be passed as they stand." Carried.

Obituary.—Resolved:—"That the Hon. Secretary do write to Mrs. Allardice and assure her of the sincere sympathy of the members of this Association and offer their condolence at the sad death of her son, Mr. W. P. Allardice."

Retiring Office-bearers.—Mr. Danvers proposed a hearty vote of thanks to the retiring office-bearers, which was carried with acclamation.

(Signed) A. F. EVETTS, *Hon. Secretary.*

Coorg Planters' Association.

Minutes of the Quarterly General Meeting of the Coorg Planters' Association held at the Bamboo Club house, 30th March 1910.

PRESENT:—Messrs. Murray-Aynsley (in the chair), H. T. Shaw, R. Hamilton, C. G. Maclean, F. W. Gerrard, C. E. M. Browne, O. B. Achard, A. H. Jackson, I. W. Finlayson, I. Hume, H. G. Grant, E. L. Mahon, G. C. Garrett, (by proxy) and R. D. Tipping, Honorary Secretary.

The Minutes of the last General Meeting were taken as read, and were confirmed.

Election of new members.—Messrs. A. L. Alexander, R. Hamilton, and O. B. Achard were duly elected as members.

It was resolved that the District Magistrate, the Assistant Superintendent of Police and the Conservator of Forests shall be eligible as Honorary Members, the Commissioner of Coorg, and the Assistant Director of Agriculture having already been so elected.

It was unanimously resolved to elect Mr. R. D. Anstead (Planting Expert) an Honorary Member of the association.

Roads and Communications.—Read correspondence on the subject of the Renard Road Train, from which it would appear that, so far as experiments had gone, it had not proved itself altogether suitable to the requirements of a District such as Coorg, and it was resolved to await further details.

This Association at the same time takes this opportunity of recording its appreciation of the assistance of the Government of Coorg in this matter.

Hutti-Madapur River. "*Davy's Crossing.*"—Read a letter from Mr. Graham on the subject, pointing out the necessity for a Double Dhony.

It was decided to request the attention of the Local Fund Board to the subject. The condition of the Government Roads was a subject for considerable discussion, and it was resolved to write to the Executive Engineer, pointing out the deterioration of the Roads in Coorg generally, and especially with regard to the consolidation of metal, which in the instance of the Ammatti-Tittimatti road, on miles 5 at 7 in particular, had worked loose, within a few weeks of the time it was rolled, and now constituted a danger especially to horses, which used this section more than any other.

The Road from Veerajendrapett to Peranbody was mentioned as being in a specially bad state, the ruts in some places being a danger to traffic.

It was resolved that the Commissioner of Coorg be asked to draw the attention of the Government of Mysore to the state of the Roads in Mysore leading to Coorg, in the hope that something may be done to improve them during the coming monsoon.

The proposed Pollibetta-Siddapur Road.—It was resolved to re-open this question through the member of the Local Fund Board.

It was noted with satisfaction that the Pollibetta-Gonicopal Road was now being much improved, and Mr. A. H. Jackson, member of the Local Fund Board, S. Coorg, was thanked for his efforts in this direction.

Planters' Benevolent Fund.—Read letter from Secretary U. P. A. S. I. on the subject.

It was resolved to circulate a call for subscriptions at the same time as the annual subscriptions to the C. P. A. were being collected.

Compulsory Cess on the exported Coffee.—It was resolved that this Association re-affirms its unanimous request for this tax, and that the Commissioner of Coorg be asked to kindly assist in the collection of the statistics required by Government, for the purpose of considering the advisability of imposing this tax.

Stamped papers for Maistries and Coolies Agreements.—Read a letter from Mr. Graham, containing a ruling of the District Magistrate, which affirms, that all contracts shall be drawn up on 8-anna stamped papers, irrespective of the amount of the advance.

It was resolved.—That as hitherto this ruling had not been in force, the District Magistrate be asked to look further into the question. The Association at the same time pointed out the hardship entailed on coolies, who took trifling advances, of say Rs.5 and under, in their being taxed to the extent of 8 annas for the agreement paper.

Read Letter of Secretary to the U.P.A.S.I. re-contribution to the Sc. O. Scheme. Resolved to forward a further sum of Rs.100, subject to adjustment when the amount of coming season's subscription was decided upon.

Rinderpest.—It was resolved to point out to the Commissioner of Coorg, that there had been some cases of this disease, on the main Roads, and having in view the seriousness of this disease, to ask what steps, if any, were being taken, for cremating or otherwise destroying the carcasses lying on the road sides.

Police Patrols.—It was resolved to draw the attention of the Assistant Superintendent of Police to the very heavy traffic on the Perambody Ghat Road during the dry months, and to request that a regular Police Patrol be instituted on the 18th mile between Veerajendrapett and the Coorg frontier, during the Crop season.

The proceedings closed with a vote of thanks to the Chair and the Honorary Secretary.

(Signed) R. D. TIPPING,
Hon. Secretary, C. P. A.

SELECTED CUTTINGS.**The Balance of Life in the Soil.****II. THE EFFECTS OF STERILIZATION.**

The general considerations which were given in the last number of the *Agricultural News* in relation to the state of the soil, and to the changes which may constantly take place in it, led to a discussion of the effects that are obtained when the soil is subjected to influences which interfere with the balance between the different forms of living matter by which it is inhabited. The work of various investigators was shortly mentioned, including that of Russell and Hutchinson, the latest experimenters on the subject, the consideration of whose labours, in view of their importance, was reserved for this number.

In these experiments, the soil was treated in four ways, all of which resulted in partial or complete sterilization. In the first two, partial sterilization was effected by heating the soil to a temperature of 98°C ., or by adding 4 per cent. of toluene, which was allowed to escape at the end of three days by spreading out the soil in a thin layer. According to the third method, the toluene was allowed to remain in the soil during the whole of the experimental period. As a fourth variation, a few experiments were made with soils that had been completely sterilized by being heated to a temperature of 125°C . A control was supplied by a fifth series of experiments, in which the soil was not treated. The soils, after treatment, were moistened and kept for definite periods in bottles closed by cotton wool, at the temperature of the laboratory. It may be mentioned that the sterilizing agent employed in two of the series of experiments—Toluene—is a liquid hydrocarbon, very similar to benzene in its constitution and properties, which exists in light coal-tar oil, and is obtained when balsam of tolu, wood, and some other organic bodies are distilled. Like many similar substances it is very destructive to life of every kind.

The first result obtained in the experiments was that "the increased productiveness of partially sterilized soils is due to an increase in the amount of ammonia present." Considering the partially sterilized soils, it was found that, at the end of twenty-four days, the soil that had been heated to 98°C . showed the greatest increase in the amount of ammonia present; the soil that had been treated with toluene, which had subsequently been allowed to evaporate, came next; then the soil from which it had not been allowed to escape: while in the case of the untreated soil, the increase in the ammonia content was insignificant in comparison. Other effects of partial sterilization were found to be an increase in the rate of production of unstable nitrogen compounds, and the destruction of nitrifying organisms. In this case, there is a difference between the action of heat and that of toluene, for in the latter instance, they thrive once more, on being re-introduced, while in the former they do not. . . .

The next step in the investigation was to discover the cause of the increase in the amount of ammonia. Two suggestions to account for this arise: (1) that some agency is present which causes increased production, (2) that some agent which continually consumes the ammonia under ordinary conditions, has been removed by the treatment. In the latter connexion, nitrifying bacteria do not enter into the question, as they have been proved to be completely destroyed by the sterilization. That the ammonia is consumed by any other agency was disproved by adding small quantities of ammonium salts and recovering them unaltered, except for a small proportion that had been converted into nitrates owing to the action of re-introduced nitrifying organisms. The results obtained led to the adoption of the first conclu-

sion, namely that actual *production* accounted for the greater amount of ammonia that was present, with the additional inference that this was owing to the action of bacteria in hastening the decomposition of substances in the soil.

The question then arose as to why the bacteria should produce ammonia at an increased rate, after partial sterilization. Russell and Hutchinson confirmed Hiltner and Stormer's discovery that bacteria multiply more quickly and reach much greater numbers after that treatment. The rate of increase was determined, and this was found to be paralleled by the rate of increase of ammonia, thus giving rise to the inference, already stated, that the greater production of ammonia was due to the action of bacteria.

A detailed examination of this conclusion showed that there was no evidence that the kinds of bacteria which continue to exist after the treatment are stimulated to greater action by it, an explanation which, as has been stated already, is due to Koch—but that the contrary is actually the case, for certain forms that were isolated from the soil treated with toluene all showed less activity than those of the same kind from the untreated soil. Nor was Hiltner and Stormer's suggestion, to which reference has already been made, that the increased activity was due to a change in the type of bacteria that was present in the greatest numbers, upheld. The simple conclusion was reached: 'the increased ammonia production in the partially sterilized soil is due to the increased numbers of the bacteria.'

As this is the case, there must be some factor present in ordinary, untreated soils which limits the rate at which bacteria are produced, but which is removed by the action of toluene or heat. That this factor is not bacterial was shown by adding a filtered soil extract to a treated soil when there was an increase of bacterial action, whereas if untreated soil was added to treated soil there was no increase of such action, but rather a decrease. Thus the limiting factor must be something in the untreated soil which could not pass through the filter that was used for the soil extract. It seems that this factor is not a toxin, as has been suggested by Whitney and others, for this would affect the nitrifying bacteria most, as they are more sensitive than those which produce ammonia, yet nitrates accumulate in untreated soils.

The conclusion is reached that the limiting factor is a living organism or organisms, for, as was stated in the last paragraph, when untreated soil was added to the treated soil, the bacterial activity, and therefore the rate of production of ammonia, was promptly diminished. The further inference is made that the organism is probably large in comparison with bacteria, for it is only the soil, and not the filtered extract of the ordinary soil, that can produce the effect under consideration. Examination of the two kinds of soil showed that no large organisms were present in that which had been heated; in the soil treated with toluene, the larger organisms were also absent, only small ciliated infusoria being found; while all these organisms were present in untreated soil. As the large organisms are about one thousand times the size of bacteria, it is easy to understand that they are serious competitors with the latter, even apart from the fact that they probably effect actual destruction of the bacteria.

The work of these investigators, then, appears to show that the number of bacteria in the soil is limited by the presence of comparatively large, competing and destructive organisms, and that the increased fertility of soils that have been partially sterilized, is due to the killing of these, and the consequent increase in the rate of production of bacteria, with the concomitant increase in the rate of formation of ammonia.—*The Agricultural News.*

The Planters' Chronicle.

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The Scientific Officer.

Mr. R. D. Anstead returned on Wednesday evening from a tour in the Mundakayam and Central Travancore districts. Reports of this tour will be published later, and will include a digest of an address delivered before the Central Travancore Planters' Association at Peermade on the 9th instant. The subjects dealt with were Helopeltis and Manuring of Tea. An address was also delivered, a few days earlier, before the Mundakayam Rubber Planters' Association, the subject in this instance being Rubber and its diseases.

Mr. Anstead expects to leave for the Shevaroy's early next week. After making a short stay there he will proceed to the Nilgiris, to complete his inspection of that district. When there previously he was only able, on account of the monsoon season, to visit the Eastern slopes. He has now in view a tour embracing the Oucherlony Valley and Tea Estates round about Ootacamund.

The Planters' Benevolent Fund.

Copies of the rules of the S. I. P. B. F. are being prepared in the form of a neat booklet and will be ready in a few days, when a supply will be sent to every District Planters' Association affiliated to the U. P. A. S. I.

Hybridised Coffee.

The following is an extract from a letter written by Mr. Rhodes James to the Scientific Officer:—

"The subject of Hybridisation is of the greatest interest now, as it seems to be in that direction that Planters can hope for success against green bug.

"I should much like you to see some Hybrids I have when you next visit the Nilgiris, if you could kindly manage to do so. Your advice would doubtless be of value. I have only about 30, of various grades, and am now mixing seed of the 4th generation. One or two of the trees of the 3rd generation seem very good indeed.

"For this season's flowering, which will come with the next rain, I propose enclosing the best specimen of all the 3rd generation hybrids in mosquito netting,—so as to prevent fertilisation from its neighbours and from Arabica.

"I understand that fixity of type is obtainable in the 3rd generation, but I conclude that in order to ensure this some protection against outside fertilisation must be afforded.

Scientific Officer's Papers.**XXV.—FERTILISERS FOR TEA.**

The information contained in the following notes has been kindly supplied by the proprietor of several South Travancore Tea estates for publication for the benefit of tea growers.

The estates in question are at elevations ranging from 1,200 to 3,000 feet, the temperature ranging from a minimum of 64·65 degrees in December and January to a maximum of 87·88 in the same months, the average minimum being 68, which is also the minimum from May to November, and the average maximum 83. The annual rainfall is about 168 inches, the dry season lasting from November to March, the average rainfall for the three months from January to March being only 4·2 inches. The wet season is from April to November with an average of 161·2; June, July and August being the wettest months.

The soil is a fairly free loam containing decomposing Gneiss and Cabook. It has a fair mechanical condition, but chemically it is somewhat deficient in Nitrogen, Magnesia and Phosphoric Acid. It also contains very little of the lower oxides of Iron, but a fair amount of Potash which would be rendered available by cultivation. The mechanical analysis was :—

Fine soil passing	90	mesh	...	...	20'00
do.	60	mesh	...	...	29'00
Medium do.	20	mesh	...	...	3'00
Coarse sand and small stones	...	...	...	...	48'00
					100'00

The essential parts of the chemical analysis showed :—

Organic matter	...	...	...	8'90
Oxide of Iron and Manganese	...	...	...	7'20
Lime	...	...	...	0'10
Magnesia	...	...	...	0'043
Potash	...	...	...	0'138
Phosphoric acid...	...	...	...	0'038

Containing Nitrogen	...	...	...	0'140
Acidity	...	...	...	fair

One field of tea, 22 years old, before manuring showed a falling off in yield, the leaf being of poor quality and growing to banji before the shoot had time to mature. In 1906 this field was given an application of Fraser's mixture at the rate of 729 lbs. per acre; in February 1908 an application of Parry's manure at the rate of 1,015 lbs. per acre; and again in February 1909 an application of Parry's manure at the rate of 640 lbs. per acre.

The crops were as follows :—

1904	...	...	...	796	lbs. per acre.
1905	...	...	...	463	do.
1906	...	...	...	590	do.
1907	...	...	...	376	do.
1908	...	...	...	1,013	do.
1909	...	...	...	982	do.

The trees have now quite recovered their vigour.

The following is a comparative statement of the cost of Fraser's mixture (Colombo) and Parry's fertiliser with equal strength per acre of essential fertilising ingredients, *viz.*, Fraser's 840 lbs. and Parry's 1,000 lbs. per acre, and the actual cost on the estate including transport :—

Strength % in essential fertilising ingredients.			Composition of mixture.	lbs. per acre.	Nitrogen.	Phosphoric acid.	Potash.	Cost per	
Nitrogen.	Phospho- ric-acid.	Potash.						ton.	acre.
<i>Colombo mixture.</i>									
6'5	1'5	1'5	...	250	16'25	3'75	3'75	Rs. 91 92	cts. 10 26
7'75	...	...	Castor cake ...	194	14'96	...	...	109 42	9 48
6'5	3'0	...	Ground nut cake	100	6'5	3'0	...	96 92	4 33
20'3	...	...	Fish	116	23'49	...	...	254 42	13 18
12'5	...	42'0	Sulphate of ammonia (95%)	80	10'0	...	32'6	244 42	8 74
...	...	51'0	Nitrate of potash	50	...	...	25'5	191 42	4 28
...	46'0	...	Sulphate of potash	50	...	23'0	...	189 43	4 23
			Concentrated superphosphate						
<i>Parry's fertiliser.</i>				8+0	71'2	29'75	62'85	148 33	54 50
7'16	3'08	5'02	(Sulphate of potash— 1 part Castor cake } 10 parts Ground nut cake } Bones — 1 part)						
				1000	71'6	30'8	50'2	93 00	41 80

Parry's fertiliser thus shows a saving of Rs.13 per acre. It costs at Ranipet Rs.78, F. O. R.

Planters will join me in thanking the proprietor of these estates for so generously supplying the above very valuable information, and it would be interesting to hear how these results compare with those obtained by others in different districts.

RUDOLPH D. ANSTEAD, *Planting Expert.*

Notes and Comments by the Scientific Officer.

31, *Plants named*.—The following plants, about which enquiries have been made from time to time, have been kindly named at Coimbatore by Dr. Barber :—

Cassia hirsuta.—A yellow flowered, dwarf, shrubby, leguminous plant, used as a cover crop on some of the Coorg Coffee estates, and known there as "Choukate." This plant would be an excellent one to grow with Rubber. Dr. Barber says it is an introduced species from South America, and that he has collected it near Calcutta, and also on the West Coast. It is common by the road sides in Coorg near Mercara, and I have also found it at Bangalore.

Crotalaria nana.—A dwarf plant about eight inches high with small, yellow, inconspicuous flowers in clustered heads; common on the drying grounds in Mysore.

Crotalaria quinquefolia.—A *Crotalaria* with a five-lobed leaf and a long terminal shaft of yellow flowers. This has been found in South Mysore, Wynaad, and Coorg.

Crotalaria retusa.—A dwarf plant about a foot high, low-growing and much branched, with simple leaves. Very common in all districts; flowers yellow with an edging of brown.

Desmodium triflorum.—A small, prostrate, clover-like plant, with purple flowers, which forms a turf and is very common by roadsides and in pastures. This should be a useful plant to grow on steep land to prevent wash.

Tephrosia purpurea.—A low growing plant widely recommended as a most suitable green dressing. It is very common on the open land round Hassan and Arsikere.

Tephrosia tinctoria.—A very common plant with purple flowers, the under sides of the leaves a silvery grey, and the pods borne in bunches on long stems.

Ipomœa vitifolia.—A trailing creeper with convolvulus-shaped, pale yellow flowers, used in Cochin and Travancore to smother out weeds, and especially "Illuk Grass." It is known in these districts as "Hop Vine." I also found the plant in the Wynaad.

Sesbania aegyptiaca.—A tall, lightly branching, plant with yellow flowers common in paddy fields and swamps in the Wynaad, where it is known by the name of "Pulian Nellie."

Sesbania aculeata.—A similar, but smaller plant found in similar situations in South Mysore. These two plants are closely related to "Daincha" (*Sesbania cannabina*) which is highly recommended by Dr. Mann as a green dressing for Tea. These two plants should be given a trial in their respective districts. The roots are densely covered with nodules.

Tridax procumbens.—A very common weed, especially in Cochin and South Travancore, where it is often called a "Dandelion." It is a Composite with a trailing habit, and small yellow, daisy-like flowers which appear in the dry season.

RUDOLPH D. ANSTEAD,

Planting Expert.

DISTRICT PLANTERS' ASSOCIATIONS.**Shevaroy Planters' Association.**

Proceedings of a Committee Meeting held at the Victoria Rooms, Yercaud, on Monday, 11th April, 1910.

PRESENT :—Father Rochet, Messrs. C. Rahm, F. D. Short, J. C. Large, S. M. Hight, B. Cayley, C. G. Lechler, and Chs. Dickins (Hon. Sec. and Chairman).

Notice calling the meeting was taken as read.

Accounts.—The accounts from December 1909 to end March 1910, were circulated and found in order.

Grass Permits.—Read letter from T. P. Peak, Esqr., D. F. O., South Salem, dated 15th March.

Resolved that the Hon. Sec. write and thank Mr. Peak for his promptitude in supplying this Association with the permits.

Roads.—*Yercaud to Valalakadai Feeder Road.*—Read letter from Mr. J. C. Large, dated 22nd March, complaining (1) that the above road has been considerably narrowed from its original width, and (2) earth having been spread all through the dry weather, the road has become almost impassable.

Resolved that the Executive Engineer, Salem, be written to and asked if the Feeder Road from the Lake to Velalakadai Estate, cannot be kept to its original width of 12 feet, outside the drain, and that it be pointed out that owing to the new system of piling on earth, so as to obtain an inward slope, the road has in many places been reduced to about 9 feet, and that this width is altogether insufficient to allow traffic to pass. This Association would further point out that piling on loose earth all through the rainless weather from December last has made the road very trying to all traffic.

Auditing of Association Accounts.—Read letter from Mr. G. Turner, dated 24th March, suggesting that the S.P.A. accounts be audited annually.

Resolved that the accounts be audited by two members before the A. G. M.

Voting.—Read letter from Mr. E. Large dated 5th April, *re*: his voting powers. Resolved that the Hon. Sec. inform Mr. Large that on his paying his annual subscription to the Association he has a vote at any General Meeting either in person or by proxy.

Scientific Officer.—Read and recorded letter from Sec. U. P. A. S. I. dated 8th April, stating that the Sc. O. will visit the Shevaroy about 17th instant.

Also read and recorded.

Circular No. 10/10 from Sec. U.P.A.S.I. dated 16/3/1910.

" " 12/10 " " " 29/3/1910.

(Signed) CHAS. DICKINS,
Hony. Secy. and Chairman.

—: o :—

The Imperial Trade Correspondent at Durham (Mr. A. D. C. Agnew) reports that the area covered by tea plantations in Natal is stated to be 6,000 acres, two-thirds of which are in full bearing. Last year's crop was 500 tons larger than that picked in the preceding season, but it was insufficient to meet the demand. The coming crop promises well.

South Travancore Planters' Association.

An Extraordinary Meeting of this Association was held on April 9th to consider the "Green Tea Bonus."

Read copy of Mr. Romilly's letter of March 26th to the Secretary U.P.A.S.I. which most clearly puts the arguments in favour of the bonus.

Read letter to Chairman of the Association from the Secretary, Tea Cess Committee.

The question of Green Tea supply and demand having come very much before planters during the past year and the fact that our district is advantageously situated for contributing to this supply, this Association unanimously

Resolved that the Tea Cess Committee be asked to regrant the bonus of 6 pies per lb. previously paid to planters for Green Tea.

This district has not previously been in a position to manufacture Green Tea, owing to the want of a local finishing factory, and a market, both Calcutta and Colombo being inaccessible, the former owing to the distance, and the latter owing to the import duty, but now they have the assurance that a factory, and a market, will be provided in a central and easily accessible situation, and some 3 to 4 million lbs. would be sent to the factory with a probable yearly increase provided the bonus was regranted, and they would ask the Committee to give the bonus question their early and favourable consideration.

A perusal of Mr. Blechynden's reports during the past year clearly show how little effort is required to secure a ready market for Indian green tea in the States, other reports give the same conclusion in regard to Canada. This Association feels that now is the time, when black tea has an assured market and requires little or no advertising, to exploit the green tea market in every possible way, as tending to meet demands that can never be supplied by black, and will, by reducing output of the latter, help to keep up the present very satisfactory prices.

Without in any way wishing to reflect on the Cess Committee, this Association feels that this district has not hitherto received other than very indirect benefits from the Cess although regular contributors to the fund from its inception.

Resolved further that a copy of these minutes be forwarded to the Secretary, U. P. A. S. I.

Read Mr. J. S. Valentine's letter of the 5th April stating that he wished his cordial support of the resolution recorded.

The usual vote of thanks closed the meeting.

(Signed) L. G. KNIGHT,
Honorary Secretary.

—:o:—

An Indian Tea Association circular gives publicity to a letter on "Disinfection of Tea Seed" from Dr. G. D. Hope, Scientific Officer, who writes:—

"Formaline is largely used for the purpose of disinfecting seeds. Commercial formaline consists of 40 per cent. solution of formaldehyde, which is a powerful disinfectant. Tea seed can conveniently and safely be treated with a 0.25 per cent. solution of commercial formaline. This can be prepared by mixing commercial formaline with water, in the proportions of 1 volume formaline to 400 volumes of water. Tea seeds should be placed in such a solution for two hours and afterwards taken out and carefully dried by exposing to the air in a clean cool place. During drying the seeds should be turned over occasionally so as to expose them to the air on all sides."

CORRESPONDENCE.**Hybridised Coffee.**

Sir,—As Mr. Anstead has referred to this estate in his article on Hybridising and as some others seem to be taking interest in the subject, will you allow me to add a little to what he has said and incidentally to correct one small mistake?

We have only got to the 5th generation; my brother and I have only been working a little under 15 years and we have made no use of seed from any but pretty mature trees. We are now planting seed from a few selected trees of 4th generation and use some from selected trees of the 3rd generation occasionally. In three years time we hope to have a larger supply, as we are getting into steady work. The amount of success so far is very encouraging.

Our standard 3rd generation tree was this year picked for valuation. It had the worst crop it has ever given and only produced 1½ lb. of cleaned parchment coffee which was valued at 50s. to 55s. at home. There was also of course some cherry. We regard this tree as being too near the Liberian type, and this is the 3rd generation tree selected for Mr. Anstead's experimental work.

I am sorry to say that weather has been most unfavourable, as it was last year, and a large proportion of failure is probable.

Our 4th generation trees are planted along a path in ordinary Arabica coffee, and as even these are slightly inclined to Liberian type we leave them unprotected during blossom in the hope that a further admixture of Arabica strain may improve the quality. This is rough and ready and unscientific but it is the method we have employed all through. The 5th generation plants obtained by showing this seed appear to be just strong Arabica. We only began this generation last year on a small scale.

Yours faithfully,

CHUNDRAPORE,
Mudigere, 12—4—1910.

(Sd.) JOHN G. HAMILTON.

Seeds.

8th April, 1910.

I see that a Bangalore firm is advertising *Crotalaria Striata* seed at Rs.2-0-0 per lb. in your paper. If there is any demand for the seed I could let you have it at 50 cents per lb., the carriage to be paid by the buyer.

I have at present about 1,000 lbs. on hand and will shortly harvest as much more.

Planters, especially those interested in rubber on steep slopes, are going in extensively for green manuring in Ceylon.

I am also growing several other most valuable varieties of green manures, such as *Tephrosia Candida* (Rs.2) and *Tephrosia Hookeriana* (Rs.5) per lb.

As no one else possesses the latter seed in Ceylon and we have only a small quantity it is necessarily expensive, but I am just going to sow an acre, which will provide me with sufficient quantity of seed to enable me to cheapen it considerably.

(Signed) J. A. HOLMES,

(Controller, Government Experiment Station),
Peradeniya.

8th April, 1910.

COFFEE.

The Curing of Coffee.

(Extracts from Paper Read Before a Meeting of the Christiana Agricultural Society, Jamaica, October, 1909.)

The first and foremost necessity is that the coffee *must be cherry ripe*, when it is picked, otherwise the quality and quantity of good marketable coffee will be seriously decreased.

Now what is cherry ripe coffee? (a) It is *not* coffee that has turned yellow, or that may be just beginning to shew signs of turning red, still less is it coffee that is only beginning to yellow.

(b) It is *not* coffee that was ripe a week or ten days ago, and of which the cherry skin is turning or has turned black and is beginning to dry on to the seed.

(c) But cherry ripe coffee is just what the name indicates, *viz.*, coffee that has just got to the stage of being bright red like a cherry, in which state the cherry skin is soft and juicy and very easy to be taken off.

Why is it that best results are not obtained from either *unripe* or *over-ripe* coffee?

(d) *Unripe*, because in this state it is impossible to remove the cherry skin by any machine without injuring in a greater or lesser degree the next or parchment skin, and the least injury to this parchment skin very seriously affects the quality of the coffee.

(e) *Over-ripe*, because in this state the cherry skin has dried up, and with it the gummy substance between it and the parchment skin, and thereby renders it impossible to remove the cherry skin without injuring the parchment skin, causing similar loss again.

Further, the gummy substance in *unripe* coffee has not got to its right state yet, and in *over-ripe* coffee has dried up, making it impossible to get the right fermentation before the coffee is washed.

Hence it is impossible to get the best results unless the coffee is all properly cherry ripe when picked.

It is a very fatal mistake to leave coffee which ought to be picked this week until next week, and then pick as well as this, that which will only be ready for picking one or two weeks' after. Such a policy is most assuredly taking "Short pass which draw blood."

2. It is of the very greatest possible importance, that the *pulper* should be in *perfect order* and under *proper control*, the copper, the jaws or chops perfectly accurate and set exactly right, the sieve in good condition and not allowing imperfectly pulped coffee to drop through, and further, a good supply of water during the pulping, this latter being very important. In short, the *man* must be *master* of the *pulper*.

3. The third essential is, that the coffee must be pulped the same day it is picked or at the very latest the day after, and the reason for this is twofold. (a) Because the longer left the more danger of the parchment skin being injured with the pulper, and more of the cherry skin being left on the coffee.

(b) Because of the difficulty of getting the proper fermentation and therefore of washing clean.

4. Next in order comes the *fermentation*. The length of time necessary depends altogether on the state of the ripeness of the coffee, but should not be less than twelve hours or more than 30 to 35 hours after the

pulping. To secure even and correct fermentation, spread the coffee in even thickness over the washing tank and just barely cover with water.

5. When the fermentation is complete, the coffee ought to be thoroughly washed.

To secure this there must be water and plenty of it.

The *least* water necessary now, is *at least six inches* higher than the coffee in the cistern though this amount is hardly sufficient, otherwise it is impossible to skim off the light seeds and the particles of cherry skin which float over the good coffee.

Most small settlers make a big mistake when they seem to think it is sufficient just to rub and stir the coffee about in a *little* water until the gummy substance comes off, whereas the *chief object* of washing is to get away from the good parchment coffee all *light and inferior* coffee and all remains of *cherry skins*.

6. We now come to the *drying*, and what an amount of loss is caused by not attending properly to this.

It is all important now to prevent two things happening. (a) All *mildewing* and *moulding* of the parchment skin after it has started drying and (b) *not under any circumstances* to get the parchment coffee *wet* after it has started drying.

Most people think that if the fresh-washed coffee gets a day's sun, it has dried or quailed sufficiently to put up and needs no more drying until the time for milling or cleaning comes, whereas with the best washed coffee it is not safe to store it up until it has received at least three days' drying, though four days is a much safer minimum. And why? Because with less, mildew and mould will affect and discolour the parchment skin, which in turn will affect the coffee bean itself: and every berry that has received any injury to the parchment skin and bean itself, will very speedily go from the *mildew to rot* and be absolutely ruined and lost.

I can safely say that at least three-quarters of all the bought parchment coffee that I have ever handled, has produced varying degrees of loss through this *not drying enough at the start*, and causing most of the injured beans to absolutely rot.

The loss in weight of good coffee that Jamaica reaps every year but loses again through this *careless neglect* in something enormous.

I make bold to say that not one-half of the coffee sold as parchment (in these districts) ever sees the sun again from the day it is put up when it is said to be quailed, until it is sold as parchment, by that time anywhere from October to March or April.

Further, no one has any business to sell, still less anyone to buy, parchment coffee as such *until it is dry*, except at a correspondingly less price than the market price. And dry means dry, not green or half or three-quarters green.

A quart of good parchment coffee when *dry* ought to weigh 1 lb. If it weighs *less* and yet it is *dry*, then it is clear that the coffee was *not skimmed* and will turn out bad. If it weighs more then it is equally clear that the parchment coffee is *not dry*.

Thus if a quart of parchment coffee weighs $1\frac{1}{2}$ lbs., which is about the average weight as sold in these parts, a barrel will weigh 140 lbs., and with the price, at say, 20s. per barrel, such a barrel bought by weight at 112 lbs. to the barrel, would only be worth 16s. *without* any deduction for the drying. And so on in proportion.

Every time the coffee gets wet after it has once started drying, something has gone off the quality and hence off the market value.

It is also very essential to keep the barbicues or ma thoroughly clean, as all dirt hampers the drying, and especially in the early stages is very apt to seriously affect the aroma or smell of the coffee, which is almost as important as the colour when it comes to selling.

We come now to the *cleaning*, or milling or grinding as we mostly call it an error.

It is absolutely necessary before cleaning, that the parchment coffee *perfectly dry*, and in the second place that it be *well warmed*.

In the first place because the coffee cannot be dried after it is cleaned, and in the second place because the coffee will clean three or four times as quickly and more than this, it is when well warmed that the *silver skin* comes off easily. If the coffee is not warmed when cleaning begins, it is next to impossible to get the *silver skins* off.

A great deal of Jamaica coffee fetches lower prices than it otherwise would just because of this neglect.

It is peculiar thing but nevertheless quite true, that with all the foregoing conditions carefully carried out, there will be some injured or inferior beans which no care or machinery can separate from the good coffee, hence the necessity for the final stage, viz :

8. *Hand-picking* :—No coffee should be sold until it has been carefully hand-picked, even if it has been so carefully prepared that there may be only a few ounces of inferior coffee out of 100 lbs., yet it should be done and is worth the trouble taken.

Anyone who has carefully attended to *all* of the foregoing eight conditions, will have a good quality of coffee to sell, and deserves to get a much better price than his careless neighbour and will do so, if he only sticks to it, and can always be sure of it from me, as it is one thing that I have always tried to do and always will do, viz : pay more for a better quality.

In order to shew you that I know what I am talking about, when I insist that all the foregoing *are essentials* and absolutely necessary for the proper curing of coffee, I will give you a comparison between my own coffee which I cured on these lines last crop and what I bought both in the cleaned state and in parchment.

Of my own : out of a total of 5,049 lbs. of good coffee, I extracted by machinery and hand-picking 73½ lbs. of triage ; that is 1'45 per cent. or say 1½ lbs. triage out of every 100 lbs.

If I include all the skimmings, then out of 5,624 lbs. I extracted 133 lbs. of triage or 2'36 per cent. or say 2½ lbs. of triage out of every 100 lbs.

Compare this with what I bought : out of 95,538 lbs., I extracted by machinery 5,884 lbs., and by hand-picking 3,173 lbs., or a total of 9,057 lbs. of triage, which gives 3'32 per cent. or 3½ lbs. per 100 lbs. by hand-picking and 6'16 per cent. or 6 one-sixth lbs. per 100 lbs. by machinery or together, 9'49 per cent. or 9½ lbs. of triage out of every 100 lbs., and this supposed to be *without the skimmings*, as against 2'36 per cent. or 2½ lbs. out of my own including the skimmings.

Had these 95,538 lbs. of coffee been as carefully cured as my own, there would have been no less than 6,788 lbs. more of good, marketable coffee ; and further, the whole lot would have realised at any rate a few shillings per cwt. more in the open market and saved the cost of hand-picking and extracting by machinery 6,788 lbs.—ALFRED WALDER, *in the Journal of the Jamaica Agricultural Society.*

SELECTED CUTTINGS.

The Mulch.

BY O. W. BARRETT.

Director of Agriculture, Lourenco Marques, Mozambique.

The motto of modern agronomists should be, "Tilth, mulch, and microbes." The most important of these may be microbes, but mulch is a very big word, and one of the greatest factors in plant economy.

If there is one fundamental principle of plant cultivation that is neglected more than any other, it is unquestionably the artificial protection of roots from heat and dryness dangers.

Tilth has to do with all the major operations of soil manipulation. Microbes, under favourable conditions, attend to the oxidation, nitrification, and other chemical transformations which put crude organic substances into the plant food form; indirectly, with the acids "set free" (*sic*) by the decomposition of humus, and possibly by their own toxins and excretory products, they are also concerned with "the breakdown" and solution of the mineral elements themselves.

To give these microbes a "square deal," in other words, to keep the soil surface fresh and moist, and at a more or less even temperature, to prevent wind-drying and sun-burning, to give the root-hairs on the feeding roots a chance to take their liquid nourishment in comfort and abundance, we must *mulch*.

It is a sad fact that only a small per cent. of the producers of vegetable products know, or even care to know, the prime functions and qualities of plant roots, that, the very large majority of planters, and even horticulturists, do not use mulches. It is sad because it means an unnecessary and unconscionable loss of probably about 16 per cent. of the normal production of the world's cultivated crops. And, putting the total annual value of all merchantable products of cultivated plants at about £5,000,000,000, doubtless an underestimate, the loss from the non-mulch system of the majority of agronomists is a matter of some £800,000,000 at least. It may be argued that this is not lost, that it is "left in the ground;" but this point needs no reply, it merely asks the question whether a *forest* soil would *outlast a bare* soil. Now that the modern farmer has found out that the chemical analysis of soils is a farce, that an array of digits and decimals has but little to do with fertility, that the plant knows more about it than the test-tube, and that chemical fertilizers are not plant foods, a big step forward has been made. But as to the subterranean battlefield where living matter must meet and try to devour the cold, dead grains of one-time rocks—there the question of economy and ecology are left to fight it out. Bacteria and toxins, colloids and enzymes, antibodies, acids, a medley microcosm, all somewhat affected by each, and all more or less successful in breaking down the mineral material into stuff that plants can make their ashes (skeletons) with: these factors, though plainly demanding both air and moisture that the good work may go on, are only too frequently neglected *in toto*; the meaning of the battle, the armies, the weapons, and even the results, are grievously ignored by the average agriculturist.

One half of the £8,000,000 lost yearly through ignorance and carelessness in attending to crop roots would not only pay for all the Government agricultural appropriations and all the scientific instruction along all the lines of theoretical and applied agronomy in the whole world, but would keep for five years a mulch expert in every farming district, in every country, and

establish, on five-years subsidies, 1,000 well-equipped institutions for plant growth investigations.

Until recent years the art of farming was ahead of the science; the planter did "thus and so" because certain methods were generally followed with good results. To-day the science, though only glimpsing the new light on the high points of modern agriculture's broad domain, is soaring above and beyond the mere art of plant production. To be sure, in some branches of horticulture the art seems more developed than the science; but even there the scientific foundation and framework is being gradually demonstrated. The future oleraculturist will investigate the idiosyncrasy and inherited Mendelian characters of each variety before he puts it out on a large scale. The viticulturists' sons will keep an eye on their "cultures" in the handy-by laboratory.

A square deal for the roots! Protection from their enemies, the venomous grass-root excretions (that can make even a lusty orange-tree sick and choke the vigour out of the best stand of maize), the burning rays of the sun, the deadly soil-surface dryness, decent bed and board, i.e., tilth and humus: give them these, and there will certainly be an increase of hundreds of millions of solid cash which the planters will have to spend.

If mulching were an expensive affair or difficult, there would be more sympathy for the losers. But the dust mulch is of the simplest preparation; the straw, or leaf blanket is, except for the grain crops, almost always possible and profitable, the live mulch, or "cover crop," is the triple-action modern implement which the farmer is beginning to wield very successfully in the soil-food-man war. If roots were only outside, on the top where the easy-going, well-meaning, farmer could see them and note their symptoms and understand them! But, of course, being stuck into the ground, they are just anchors or props, and therefore their comfort—under the even coolness and moistness of a mulch where the microbes can multiply and the humus business hum—their very existence is practically forgotten.

Once on a cacao plantation belonging to one of the well-known English firms the manager ordered a labourer from the dank, unsanitary recesses of the sodden "field" to demonstrate to me the good old way of "forking" the surface soil. After an embarrassing *quart de minute*, the perplexed fellow said, "I can't, boss; I not got my *cutlass*." Such things seem incredible, of course, but one can see, only too commonly, the root-murdering method in actual practice, just as one may see grass knee-high in coconut nurseries, or scorching hot white sand between the nearly half exposed nuts, which have an *unaccounted for* habit of dying, or at least sulking for years.

To suggest a leguminous live mulch to the more advanced class of agriculturist is to meet with the objection that "there is only enough moisture, to say nothing of food, in the ground for the *primary crop*, and, besides, the blanket crop would hardly give back its own seed."

The vertical forking method, to let in air and food and break the clamminess of clayey or silty "packed" soils, which was first put before the Agricultural Society of Trinidad and Tobago in 1907, was hailed with gladness by perhaps half-a-dozen cacao planters and put into immediate, if but transitory, practice. . . . Give a coconut, orange, tea, or coffee estate manager a live mulch plant to keep down the grass and weeds and to freshen and enrich the surface soil, then hear him explain that he has long-standing orders to make "not less than three general cleanings per annum," and they must be made on a very generous scale under pain of the suspicious proprietors' criticism.—*Tropical Life*,

The Planters' Chronicle.

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(INCORPORATED.)

Cinchona.

In a letter, dated April 18, 1910, to the Secretary, U. P. A. S. I., the Hon'ble Mr. J. G. Hamilton writes:—

"While in Madras attending the Meeting of the Legislative Council, I had the advantage of a long conversation with Mr. Standen, the Director of the Cinchona Factory near Ootacamund, in the presence of the Hon. Mr. H. G. Cardew, Secretary to Government in the Revenue Department.

"My object was to establish a basis for requesting Government to reconsider its decision as to laying down a fixed minimum price as well as a fixed maximum per unit of Quinine.

"I made no attempt to put the matter on any other than Commercial lines and do not think that the extent of the Industry in India will ever warrant any others. Cinchona planters must be prepared to approach Government with a sound scheme which will show some benefit to the latter in return for any given to us.

"I put it to Mr. Standen that there might at any moment now be a danger of combination on the part of Java planters to raise the price of Quinine, and that if India had no reserve she might suffer badly, as we must have Quinine here until an efficient substitute is found; and that if a satisfactory scheme could be devised it would be possible to get a guarantee of almost as much Bark as is needed for yearly consumption locally, without taking any from the small Government Plantations which could be left to grow undisturbed as a further reserve.

"Mr. Standen called on me to state what form the guarantee would take, but on this point I have not been instructed: I therefore asked him to endeavour to frame an agreement which all agreed must be between Government and individual planters.

"It was also agreed that it would be absurd for Government to offer a fixed minimum without a guarantee of permanent supplies, or at all events supplies for some years to come. At present if the prices for local purchases of Bark were raised and Government required to show profit or even equilibrium in the working of their Factory, any of the larger Quinine Manufacturers could undersell them unless a very rich Bark could be supplied.

"A very important point is that planters will have to accept a sliding scale; Government will not in any case promise to pay 1 anna per unit

for a 3 % Bark with a large proportion of inferior alkaloids, and if it is insisted that they should do so I regret that it may be necessary to drop all negotiations.

"No sort of promise was given, but Mr. Standen said that he would look into accounts and see what he could do, and if there is any chance of meeting us he will endeavour to frame an agreement to be submitted to our next General Meeting in July (?). It is simply a question (admitting that none but Commercial principles are to be taken into consideration) of which is the cheaper form of Insurance:—

(1) Accumulating large stocks of Bark or quinine in times of peace (commercial or otherwise).

(2) Encouraging the growth of local reserves.

"I stated from information supplied that planters were now importing seed of richer strains and that a better Bark could be looked for in future, and it was only on this condition that I could make any progress at all, for as already stated I did not take any stand on sentimental grounds, and it is impossible to show reasonable hope of benefit to India (with the amount of information in my possession at present) if the same low grade of Bark is to be tendered all along.

"It is admitted that Government's own Bark does not work out at 1 anna per unit, but they have no intention of making planting an essential feature of their Factory and do not set up their Plantations as examples.

"I have now done this much; I have had a fair hearing and have got it admitted that some of our statements are worth looking into. After this I must be informed how to assist Mr. Standen in drawing up a satisfactory agreement in the event of his becoming willing to attempt it.

"Will you kindly obtain the opinions of Cinchona planters and instruct me as fully as possible?

"Will you kindly inform me how much Cinchona is under cultivation in private hands.

1. On the Nilgiris
2. In Coimbatore District
3. In Travancore
4. In Malabar."

The information called for in the last paragraph is required by the Governor of Madras, and the Hon. Secretaries of Associations concerned have been asked to kindly furnish it.

Remarks by individual planters of Cinchona would be very welcome.

Crotalaria Striata.

In reply to questions, Mr. J. A. Holmes, Controller, Government Experiment Station, Peradeniya, has kindly stated that when *Crotalaria Striata* is planted as a separate crop about 10 lbs. of seed suffices for an acre.

With Rubber, about 7½ lbs would be enough—across the slope, leaving a tapping path near the trees. Owing to the shade in Rubber some of the seed might not germinate, so an allowance is made for partial replanting.

The seeds sown on the Secretary's compound have germinated excellently, and a number of apparently strong and healthy young plants are now in full flower.

There is no reason to doubt that abundant supplies of seed are available from Ceylon and elsewhere, though no definite standard of value has been fixed up to the present time.

Scientific Officer's Papers.**XXVI—CLEAN WEEDING.**

On my return from a recent tour my attention was called to a number of articles, and letters, in local Ceylon and Indian papers carrying on the discussion about the advantages and disadvantages of clean weeding on Rubber estates. As planters have by this time discovered of course, this is a discussion in which I am particularly interested, being a strong supporter of the camp which believes in the judicious, and intelligent, use of weeds. Though I do not propose to join the battle which is raging in the press, I think it is my duty to planters to make some comments in the *Planters' Chronicle* on a few of the points which have been brought forward by the opposed sides in the correspondence and articles alluded to above.

In the first place, I wish it to be most clearly understood that I do not advocate the indiscriminate use of weeds of all sorts. That my point of view has been misunderstood is shown by frequent correspondence received in this office. To quote from one of the articles alluded to, a planter relates how, "he had allowed an area of rubber to be covered with weeds with most disastrous results. The growth of the trees was retarded; and in the covering formed by the weeds, all things that creep or fly, injurious to the rubber trees, found refuge—bandicoots and porcupines being particularly destructive."

This is just what I should have expected, and this is not what I call the intelligent use of weeds. The starting point of the use of weeds is a *clean weeded estate*, in my humble opinion. Having got the place clean weeded, cultivate a weed as a cover crop, and, strictly speaking, it at once ceases to become a "weed," which is a plant in the wrong place. (See Sc. O. Paper XIX.)

In the first year or eighteen months of the life of a new clearing every effort should be made, and no expense grudged, to exterminate weeds, and *then* a cover crop of some suitable leguminous crop should be sown down between the rows and *cultivated*. As suitable plants to use I would suggest the following for Southern India:—*Cassia mimosoides*, *Crotalaria hirsuta*, *Crotalaria nana*, *Tephrosia purpurea*, and *Tephrosia tinctoria*.

It is frequently claimed that rubber clearings come on faster under a system of clean weeding than under a system of cover crops. Has this been really *proved* in Southern India? Has the system of cover crops, handled as I recommend, been tried side by side with the clean weeding system? It must be remembered that it is no *proof* to say that because some particular estate has done extremely well under a system of clean weeding, *therefore* the clean weeding system is the best that can be adopted. It is the "therefore" which does not follow; it is not proved that it would not have come on still better under an intelligently used system of cover crops.

These are points which I suggest to planters should be taken into consideration, and I maintain that we need more carefully devised experimental comparison of the two systems side by side on the same land, under the same conditions, and less argument on paper.

Another point to be considered is this. Is the bringing of a rubber clearing into rapid bearing everything that is to be considered? Of course with the present high prices it is tempting. But is it sound, financially and practically, to denude the top soil, and risk the future of the estate to gain twelve months in the present?

This is a question I should like planters to carefully think about. Scientifically it is unsound, and as your 'Scientific Officer' it is my duty to warn

you of the seriousness of the annual loss of top soil caused by the clean weeding system, followed by the heavy wash of the monsoon rains, especially on steep land, and of what this is going to lead to in a few years time. The harmful effect of this is strongly pointed out by Mr. H. N. Ridley, the Director of the Botanic Gardens, Straits Settlements, in the March issue of the *Agricultural Bulletin of the Straits and F. M. S.* in an article on "Tillage of Soil."

It is most important to conserve the soil, and every effort should be made to add to its humus content, instead of transferring, as one of the newspaper correspondents aptly puts it, "the best six inches or so of surface humus straightway by momatie and scraper to the nearest paddy field or stream—a contribution *gratis* to the wealth of the native occupant, or the silting up of our principal waterways."

My own views upon the subject have been expressed, I fear, '*ad nauseam*', and I intend the above merely to suggest a few lines of thought to planters who do not hold the same views as I do, which I shall be quite content if they will give due attention to in discussing and considering this most interesting and most important subject.

(For other references to this subject see Sc. O. papers XIX, XX, and XXI and also P. C. Vol. IV, p. 197).

RUDOLPH D. ANSTEAD,
Planting Expert.

—:o:—

From further correspondence on "Clean v. Partial Weeding of Rubber" the following is extracted, being taken from a letter signed "Floruit, Floret, Floreat" in the *Times of Ceylon* of the 13th instant:—

"Acting on Mr. Kelway Bamber's advice on this estate no rubber was weeded, but periodically, once in four months or more, according to the season, the weeds were slashed across and heaped round the trees at a cost of Rs.6 per acre per year—clean weeding would have cost at least Rs.24 per acre. The result has been that very little surface-soil has been lost, and the rubber has come on so well (despite the dry climate and high South-West winds of Uva) that exactly at four years of age tapping was able to be commenced. The bark on the trees was thick and well formed, and the trees full of latex; and for quality—though the oldest rubber is now four years and four months only—the last lot sold in Colombo fetched Rs.8'70 for No. 1 biscuits, Rs.8'60 for No. 2. I may say that in parts where weeds did not grow freely enough, crotalaria was thickly sown, and when well grown treated in the same way as the weeds. . . .

"There can be no doubt that on any rubber estate, whether 100 acres or 1,000, where Mr. Bamber's system of practical and scientific cultivation is carried out by an intelligent superintendent, the gain will be enormous, as follows:—(1) saving of at least one-quarter weeding expenditure each year; (2) saving of wash with consequent retention of surface soil; (3) most valuable manure in the form of weed, mulch and litter; (4) increase in girth and condition of trees, and none hide-bound; (5) greater flow of latex when the tapping stage is reached, and excellent bark; (6) roots of trees not exposed to damage by all the soil round them having been washed away. . . .

The average size of the trees we are tapping is 18", and they run up to 25"—not so bad for four-year-old trees that have been ruined (!) by the weeds.

DISTRICT PLANTERS' ASSOCIATIONS.**Central Travancore Planters' Association.**

Proceedings of a General Meeting of the above Association held at Fairfield Bungalow on Saturday, April 9th, 1910, at 10 a.m.

PRESENT :—W. H. G. Leahy, (Chairman), D. McArthur, J. A. Richardson, T. A. Kinmond, C. G. Gordon, J. S. Wilkie, J. H. Fraser, Hon'ble V. B. Wilbraham, C. W. Lacey, F. Bissett, J. H. Cantlay, E. S. Stephens, B. Wolde, R. D. Anstead, (Honorary Member), J. Cameron, (Visitor), H. C. Westaway, (Honorary Secretary).

Chairman.—Gentlemen: Before proceeding with the business of the meeting, I wish to tender on behalf of the Association a hearty welcome to Mr. Anstead, our Scientific Officer, and Mr. Cameron, and tell them how pleased we are to see them. 'Before asking you to confirm the minutes of the last meeting I should like to point out that, as there was some misunderstanding about the labour rule then passed, I would propose that a committee of the following gentlemen :—D. McArthur, J. A. Richardson, T. C. Forbes, B. Wolde, F. Bissett, W. H. G. Leahy, and the Honorary Secretary, be appointed, and that they go into and revise these rules, which will at a later date be brought before you. Mr. Fraser was unable to continue as our Secretary, so the District was circularized, when Mr. Westaway was elected unanimously.

The minutes of the previous meeting were then confirmed.

Correspondence.—Read letter from the local Postmaster re non-delivery of local letters in reply to Honorary Secretary's letter of the 26th March. Resolved that the Honorary Secretary do write to the Postmaster-General, Madras, on the subject.

Read letter from the Chief Secretary to Government, dated 16th instant.

Resolved that His Highness's Government be informed that as far as this Association is aware the existing rules under which the lands have been granted have not been abused, as every available piece of timber except Royal trees is all used for firewood and building. Also that it is impossible to remove whole logs in tea planted say 4 x 4 ft., as it cannot be dragged out without destroying the tea.

Read letter No. 1574 from Chief Secretary to Government, dated 18th March 1910.

Read letter No. 606, 3 of 10, dated 16th March 1910 from Superintendent, Cardamom Hills.

Read letters from Secretary, U.P.A.S.I., No. 6/10 dated 28th February. No. 7/10 dated 28th February 1910. No. 8/10 dated 2nd March 1910. No. 9/10 dated 2nd March 1910.

Resolved that with regard to letter No 7/10 of the 28th February, this Association thinks the idea of publishing the contributions to the Benevolent fund a good one but at the same time would point out that until a pamphlet of the rules, etc., has been published and circulated to the various Associations, Coast Firms, Curers, etc., more subscriptions cannot be expected, and that this be done as soon as possible.

With regard to letter No. 8/10 dated 2nd March, it was resolved that this question be settled by the Secretary, U. P. A. S. I.

With regard to No. 9/10 dated March 2nd it was the opinion of the Association that the Scientific Officer should visit all the Districts in Southern India, before paying a visit to Ceylon, and that it would subscribe Rs.60 towards it, provided all other Associations subscribed.

Green Tea Bonus.—Read letters No. 10/10 of the 16th March and No. 11/10 of the 23rd March and No. 12/10 of the 29th March from Secretary, U.P.A.S.I. It was proposed by Mr. Richardson and seconded by Mr. McArthur, that in view of Mr. Blechynden's report showing the demand for green teas in America which might easily be increased and the assurance that a large and influential firm is prepared to erect a green tea finishing factory in South India which would give us a ready market for our teas (it having been already proved that South India is specially well adapted to the manufacture of green tea, and the danger of over-production of Black which we consider is no imaginary one) this Association is in favour of supporting the resolution of the Wynaad Planters' Association asking for the green tea bonus of 6 pies per lb. being renewed to South Indian Planters from the Cess funds to the extent of say 4 million lbs of tea per year. Carried unanimously.

European Medical Scheme.—Resolved that the Honorary Secretary do write and obtain the guarantees from the several estates concerned.

Motor Transport.—There was nothing fresh to discuss.

District Roads.—Read letter from P.W.D. Division Officer No. 43, dated 20th March 1910. Resolved that Government be asked to grant the Rs.500 which is estimated for the erection of a temporary bridge at the Aruday bridge 2nd mile Cardamom Hill road for the up-keep of the Stagbrook Estate private road and bridges over which the traffic is now diverted on the understanding that the new bridge is erected as soon as possible after the monsoon.

District Roads continued.—Resolved that Government be asked to put the main road Kottayam Kumali into repair without delay owing to its present disgraceful state and also that the 10% previously deducted from the grant in aid roads be refunded.

Theni Bridge.—Proposed by Mr. McArthur, and seconded by Mr. Richardson, that this Association depute 2 delegates in conjunction with the Kanan Devan P. A. to meet the Legislative Council Member of the Periakulam Taluq to approach His Excellency the Governor of Madras with regard to the long delayed construction of the Theni bridge and that a copy of this resolution be sent to the Kanan Devan Hills P. A. asking them to depute a member also. Carried unanimously.

Resolved that the Honorary Secretary do apply to Government for grants for the maintenance of the Munnans Creek bridge on Munjamallai Estate and also for the bridge on the Gramby grant-in-aid road over the Kalar river.

Resolved that Messrs. Richardson, Forbes, Fraser, Cantlay and Westaway be appointed a Road Committee. That as all Estates with the exception of Penshurst are prepared to assess themselves as before on the Cardamom Hill-Kottayam road and Cardamom Hill-Kumili road that this be done.

Proposed by Mr. Wolde and seconded by Mr. Forbes: That this Association regrets His Highness's Government should have placed the Peer-made and Periyar Pakuthies under the jurisdiction of the new Munsiff's Court at Meenatchil without previously intimating to them the intended change. Great inconvenience will be caused to all parties, as Meenatchil.

has no communication by first class cart road and accommodation for Europeans and is situated over forty miles from any Peermade Estate.

2. That a copy of this resolution be forwarded to the Mundakayam P.A. in order that joint representation be made regarding this matter if they also object to the Pakuthies of Peramathanon and the portion of Kanjirappally pakuthy also mentioned in the *Gazette*.

3. That if H.H's Government cannot rescind the decision regarding the Kanjirappally Munsiffs Court they be requested to place these pakuthies under the Kottayam Munsiff, as that Court is easier of access, has good accommodation, and is only very little further off.

4. That this Association do discuss what representation shall be made to H. H's Government regarding the serious loss several estates have sustained from the continual inroads of Elephants. Proposed by Mr. Wolde, seconded by Mr. McArthur, that Government be asked whether the rule in connection with an elephant doing damage within a quarter mile of an estate is different in Mundakayam and the Cardamom Hills to the existing rule in Peermade. Carried unanimously.

Proposed by Mr. Fraser, and seconded by Hon'ble V. B. Wilbraham, that in view of the enhanced tax on imported liquors Government be requested to grant the Kottayam Trading Company a wholesale license for their Fairfield shop, as this will now no longer interfere or be in a position to compete with the sale of arrack etc. The shop, at Fairfield having been closed owing to the liquor license not being granted is a great inconvenience to this end of the District and will be still more so during the wet weather. Carried unanimously.

Chairman.—Gentlemen : This, I think, concludes all the business before the meeting, and it is now my pleasant duty to introduce you to Mr. Anstead, who has kindly offered to give us a lecture on what he has seen and heard in the District.

Mr. Anstead's Lecture.—The following is a report of this:—Gentlemen, I should like to preface the few remarks I have to make, by saying, how very pleased I am to be up here and meet so many of you at this meeting. It seems to me that having a very large district to get over, it is essential that I should meet the men, and learn of what nature my future work is likely to be, to meet men personally and find out what their difficulties are, what they have done in the past, and what they intend doing in the future. If I am going to help you at all we must work together.

Tea.—I suppose that your great trouble is the attack of Helopeltis, but from what I have been shown up here, it seems to me that you have got the thing very well in hand. From what I have seen, you are doing the right thing. When the attack is really bad you must prune it down, burn your prunings, clean up the land, and then spray. I think that the burning of prunings is the really most important thing. If under local difficulties of labour, money and time, you cannot carry out the full programme, do not let this item be neglected. Antram has proved that mosquitoes will hatch out from prunings for period of 16 days or more, especially if these are kept fresh and green in nullahs, or by showers of rain, so you see the importance of getting the prunings burned the same day, so do not neglect the burning of prunings, do not let them lie on the ground. With regard to spraying, I am a great believer in prevention rather than cure. Spraying keeps the insects away from the bushes, and prevents them laying eggs to a certain extent, and so can be used as a preventive method. Once the attack is got in hand,

spray the whole tote if necessary, and do not wait until the blight gets bad again. One pound of imperial soap to 20 gallons of water, will work out at an application of 200 to 300 gallons per acre. Spraying is absolutely useless unless it is well done; every part of the bush must be wetted. An ordinary garden Syringe will do good work, but the spraying machine is a matter for yourselves, as your water may be near or far off. The great point to be attended to in spraying, is to wet every part of each bush with the wash. I attach great importance to attacking the disease in the very beginning. Watch your tea, and let your pluckers keep a watch for the presence of mosquito blight, and have the sprayers behind the pluckers. It is at the beginning of the attack that it can be most easily stamped out; once it has got way it is difficult to deal with.

Manuring.—I think this is an extremely important matter for tea growers to take up, and will get more and more important every year. I think there is nothing like manuring to tackle Helopeltis. It is an axiom when dealing with all diseases, that to keep the plant vigorous and at the top of its health, by manuring, is half the battle. In selecting your manure you cannot look at the soil and the condition of your tea, and say you want this and you want that; you must have a starting point. This starting point is a chemical analysis of the soil. I strongly advise all of you to, as soon as possible, get an analysis of your soil made, and the analysis I want is one that shows the availability of plant food in the soil. I think at present with the big district that I have, that you will be wasting my time by making me do these analyses, and that you should get the same done by professional chemists, and let me have them to advise you upon. Having got the analysis I can suggest a system of manuring, and you yourselves must experiment with this. Unless your soil is in a good mechanical condition, there is not any use putting in mineral fertilisers, you must bring up its mechanical condition first. The best thing, but of course an impossible one, in South India, is cattle manure. Poonacs will do but they are slow. What your soils over and over again need when they are run down is humus, and this must be supplied before artificial manures are used. One way, and perhaps the best way, under local conditions of supplying humus, is to grow a green dressing and dig it in. I think you should cultivate and grow amongst your tea a local leguminous weed. I have seen numerous leguminous plants since I came to the district and I hope you will send me specimens of other likely ones to Bangalore. The best plant I have seen is a thing they have got in Mysore and the Nilgiris. It is something like the sensitive plant but it has no thorns; the botanical name is *Cassia Mimosoides*. I have no doubt whatever that it would grow here; it grows in the Nilgiris in large quantities. After having got the mechanical condition back you can go on with mineral fertilisers. There is one thing I would like to call your attention to and ask you to think about. The manure you usually use for tea consists of Poonac of some sort, bone meal, sulphate of ammonia, or nitrate of soda, and sulphate or nitrate of potash. This is applied just before the monsoon. The mineral part, the ammonia and nitrate salts, and the potash salts, are very soluble and are undoubtedly being washed out of the soil, into the drains or rivers, and carried away. This must result in a big loss, since these constituents are very expensive. I would suggest that you either manure after the monsoon, or, if you cannot do this, then, you divide the application into two, putting the Poonac and the bone before the monsoon, and the minerals afterwards. The cost of application will be greater, but the saving in the loss of manure and the increased benefit obtained from this system will more than repay the extra cost. I should like you to think this over and conduct some experiments on these lines.

Planters' Chronicle.—I want you to use the *Planters' Chronicle* as a medium between myself and you. I am being continually asked the same question by different people, and if the questions are answered through the *Chronicle* they are answered once for all. My aim is to supply as much information as possible through the *Chronicle*, and the copies of the *Chronicle* should not only be read but filed for future reference. From what I have seen of the various Associations, I think you do not realise what a big and important thing the U.P.A.S.I. might be. Why should not every planter in the district belong to his own Association and to the U.P.A.S.I.? I hope at the U.P.A.S.I. meeting in Bangalore this year that we will see as many delegates as possible from the various Associations, as it will be a very interesting and important meeting.

In conclusion, I should like to express my thanks to the Hon. Secretary for the facilities he has put in my way for making this tour and to the individual planters who have offered me hospitality and pony post facilities. My thanks are especially due to Mr. Richardson for his great kindness and hospitality and putting his Bungalow at my service, which has made my work very pleasant and easy.

Chairman.—Gentlemen, I beg to propose a very hearty vote of thanks to Mr. Anstead for his very interesting and instructive lecture (Hear, Hear) and cheers.

With a vote of thanks to the Chair the meeting terminated.

(Signed) H. C. WESTAWAY,
Honorary Secretary.

In the statement of objects and reasons attached to a new Draft Ceylon Ordinance, it is stated that the general object of this Ordinance is to introduce a new system of defraying the expenses incurred under 'The Medical Wants Ordinances of 1880 and 1882'. *Inter alia* the Draft Ordinance makes provision:—"For the passing by the Legislative Council triennially of resolutions imposing duties on the exportation of tea, rubber, coffee, cacao, and cinchona at such respective rates as shall, in the opinion of the Council, be sufficient to cover the estimated cost of carrying into effect the Medical Wants Ordinances during a period of three years, after deducting therefrom the Government contribution of 15 per cent."

The Labour Commissioners recommended that the *maximum* export duty leviable upon coffee, tea, cacao and cardamoms will have to be raised from 10 cents a hundredweight to 25 cents a hundredweight; that that on cinchona should be remitted owing to the decline of the industry; while the maximum duty to be imposed upon rubber should be placed at Re.1'25 a hundredweight.

—:o:—

A planter from the Dutch Islands calling recently on Mr. H. N. Ridley, Director of Botanic Gardens, S. S., stated that he had remarkable increase in growth of his Pará rubber trees, after using guano, imported from Europe. A small quantity was put round each tree in a shallow trench surrounding the tree and covered in with soil. The cost was three cents a tree. This inexpensive method of manuring might be very useful in bringing on young plants.

TEA.**The Tea Mosquito.***Helopeltis Theivora*, Waterhouse.**INVESTIGATION DURING THE YEAR, 1908-09.**

A booklet issued by the Indian Tea Association (Calcutta) deals with the above subject and gives tables of the complete life history of the insect *Helopeltis Theivora* for a whole year, with some additional notes as to the method of spraying and measures for prevention of the blight. The contents are from the pen of Mr. C. B. Antram, Entomologist to the Indian Tea Association.

Copious extracts are given below, but the table of life-history is omitted, as it is not applicable to the conditions of the insect's life in South India. In the North a genuine cold season is experienced, and excessive cold imposes a severe check on the insect. Nothing of the kind can be looked for in South India. This is the more important because of the fact that spraying operations, to be really useful, should be started before the blight has established itself over a large area.

It should be noted also that Mr. Antram is inclined to insist on the importance of treating whole areas of tea which lie together at once, and that Dr. H. H. Mann, expressing concurrence in this opinion in a review of the pamphlet, writes:—"I would go so far as to say that if this is not done it is very doubtful if any great benefit will result. Until gardens which lie close to one another can agree to apply the method together, I can hardly see the possibility of complete relief from the blight to any of them."

INVESTIGATIONS, 1908-09.

Mr. Antram observes:—

"A previous pamphlet on this subject, which was published in October 1908, dealt with the life-history of the insect during the cold weather months only, i.e., from November to the middle of March. Investigations have now been carried on to the end of 1909, and figures are to hand completing the life-history for the whole year. As a supplement to the former paper a number of tables are now given at the end of the present pamphlet showing at a glance the different periods spent by the insect in its several changes for each month of the year.

Practical measures for dealing with the blight, which included spraying with soap solution, were carried out on the Rampore and Koombergram Tea Estates during the season 1908, as already reported in pamphlet No. 2 of the Scientific Department's Publications by the Indian Tea Association in 1909. Similar experiments have been conducted on a much larger scale during the past season. The experience gained from the latter experiments has conclusively borne out the results of the previous work in 1908.

The first series of experiments showed that while it is next to useless to start spraying operations late in the season when mosquito blight has established itself over a large area, the method of spraying with soap solution has proved to be quite successful if carried out thoroughly at the very first appearance of the blight. Operations in an ordinary year would probably have to be started some time in April, if not earlier, but in years like 1908 and 1909, when practically no rain fell before the middle of April, spraying would not be necessary until some time in May, as was the case in 1908 when Rampore Tea Garden showed the first signs of blight on the 8th of that month, and in 1909 at Ghazipore Tea Estate where spraying and hand-collecting was started as late as June.

"After much consideration and practical work on the subject of the most suitable method for the treatment of mosquito blight and the proper time for carrying it out, I have come to the conclusion that it is not necessary to conduct operations of spraying directly after pruning and during the cold weather, as has been suggested, although benefit would be derived if it could be done. I have the following reasons for this opinion :—

"*First* and most important, the insect is greatly influenced by climatic conditions in the early months of the year, and is killed or at least is checked by excessive cold, prolonged drought, severe storms, &c.

"*Second*.—For the above reason it is never possible to tell so early as the pruning season, no matter how numerous the insects may be at that time, whether the blight will become serious or not later in the year.

"*Third*.—Water is scarce towards the latter half of the cold weather, making the carrying out of spraying at that time expensive and laborious.

"*Fourth*.—If spraying has to be done after pruning, the whole area of the tea must be treated, because under ordinary circumstances no blight is anywhere apparent at that time in an active state. To treat the whole of the tea area at such a time has proved to be possible on very few gardens, owing to the general scarcity of water at that season and to insufficiency of labour.

"*Fifth*.—Even if every mosquito on the tea area were destroyed by spraying during the cold weather, the eggs of the mosquito would still remain unaffected and would hatch out in due course. Furthermore, adult insects visit the tea from neighbouring jungle at any and all times of the year. Therefore, the most careful spraying during the cold weather would not bring about immunity from the blight for the season.

"Considering, therefore, the conditions stated above, and that mosquito blight is not serious in every season in all districts, it does not seem necessary that money and labour should be devoted to the spraying of areas which to all appearances have no insects on them, with the idea of doing something during the pruning season towards lessening the blight in the future when climatic influences may have the same effect, and re-infection of the tea from the surrounding jungle at any time cannot be prevented. But climatic conditions, however favourable for killing or checking the insects at this time of year, will not do all that is necessary. In order that weather may have effect on the insects the methods already suggested in the past, of thinning out in pruning, of burning the prunings while still green, of removing jungle, and of manuring combined with better cultivation with the object of invigorating the tea, etc., should be adopted. These are the methods which can be carried out in the cold weather to ward off an attack of the insects, but in addition to this a direct and practical means of dealing with the blight offers itself in April or May according to the time of the first appearance of the insect on the bushes. It is universally recognised that the correct time to deal with insect pests is when they make their first appearance in early broods, and those who have had experience in dealing with such pests agree that the best method of treatment in the majority of cases is to spray, this being a method by which the whole plant can be wetted with certainty and a large number of the insects killed, while large areas can be treated in a short space of time.

"I suggested in the previous pamphlet on the subject that spraying should be started when it was found that insects appeared and punctures showed up on the bushes at the beginning of the season, and that going repeatedly round the garden spraying from the first only those bushes which were affected was of far more benefit in checking spread of the insects than solely hand-collecting them. As it was found possible to re-

commend an efficient and inexpensive insecticide that could be applied in a cheap and easy manner, a few boys kept for the purpose of spraying affected bushes throughout the season (beginning in April or May and making repeated rounds of the garden when necessary) could do considerably more good than a large number of hand-collectors. It would, therefore, seem that precautionary measures, carried out early in the season, which, if started soon enough, would not be costly, would frequently prevent a slight attack from assuming the proportions of an epidemic.

"According to the vagaries of the insect a larger or smaller number of coolies would have to be employed to keep the blight in check. When hand-collecting, at most one or two insects will be obtained from a single bush, as the capture of these will have disturbed the other and will have caused them to go into hiding. On the other hand, if an affected bush or area is thoroughly saturated with the spray-fluid not an insect should escape."

EXPERIMENTS IN CACHAR AND SYLHET, SEASON 1909.

"No insecticide yet known, uninjurious to the foliage of the tea bush, will cure mosquito blight or eradicate it for the season by one application, because short of destroying the shoots in which the eggs are buried, no treatment will prevent the eggs from hatching, as has been thoroughly tested and explained. Therefore repeated spraying must be resorted to in order to kill the young insects as they are hatched from the eggs. But there is another reason why it is necessary. Adult mosquitoes visit the tea at any time of year from surrounding jungle and therefore the tea is liable at any time of the year to be re-infected. Since a large quantity of spray fluid is required if mosquito blight is bad the ingredients of the spraying solution must be as cheap as possible.

"It must be remembered that the spray fluids used are contact insecticides, and the insects are killed only when wetted, neither have these preparations any lasting effect. One very great drawback is that insecticides which might have a lasting effect in keeping off the insect, or that would destroy the eggs, would be injurious to the bushes and hinder plucking, and therefore cannot be used.

"Fumigating machines on a large scale have been tried and found quite ineffective in killing the mosquitoes in the open air, and an overdose of fumes seriously injures the bushes.

"Complete eradication of the insects seems impossible, but if the procedure for treatment described on page 12 is carried out and particular attention is given to detail, the blight need never reach such proportions as to cause any depreciation in outturn in most seasons and on most gardens.

"The greatest success is obtained on small gardens, and isolated blocks of tea, but in districts where garden joins garden and the plant is poor hybrid it is much more difficult, and some method more drastic than this would have to be devised. Labour is seldom sufficient to carry out the work thoroughly and to keep ahead of the blight when very large areas have to be treated, or when it appears in epidemic form, as it does in some years.

"Preventive measures can however be carried out on all gardens subject to blight which do much good in checking rapid spread of the insects and in delaying the time when it becomes so bad as to cause serious loss. Heavy and scrub jungle, also bamboo jungle, plays an important part in the harbouring and distribution of the mosquito, and the cutting back of jungle as far as possible round the tea area, particularly at the southern and western aspects, should form one of the chief works on a garden for the prevention of blight. This is probably of more importance than any other item in the whole procedure against mosquito blight."

(To be Continued.)

The Planter's Chronicle.

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THE U. P. A. S. I.

(INCORPORATED.)

Glinchona.

A CORRECTION.

In last issue—p.162—it was stated that certain information called for by the Hon'ble Mr. J. G. Hamilton was required by "the Governor of Madras."

The word "Governor" was used inadvertently; it is the Government of Madras that requires the information.

Chakte Sappu.

Mr. C. K. Pittock writes:—

"In your issue of March 26th Mr. Thiselton Anderson gives '*Cassia Tora*' as the botanical name of this plant, as named by Mr. Anstead.

"In the *Chronicle* of 16th instant I note that the long 'Chakte' is identified with '*Cassia hirsuta*' by Dr. Barber.

"When Mr. Anstead was here last year I showed him a plant which the natives here called 'Chakte' and understood him to say it was a species of *Crotalaria*. I fancy there must be several species, if not genera, all called 'Chakte' by the natives, who are not particular about nomenclature, and so it would seem unsatisfactory to 'fix' a plant by its native name."

There is little doubt that Mr. Pittock's view is the correct one. However, the seeds received lately as those of "Chakte Sappu" have now germinated, and in a short time it ought to be possible to identify them. Special identification of this kind would appear to be the only safe method of procedure when seeds are sent in under vernacular names.

Peradeniya Bulletin.

It has been thought advisable to reprint extracts from some of the earlier publications of the series "Circulars and Agricultural Journal of the Royal Botanic Gardens, Ceylon." Consequently, two numbers have been issued: "Rubber in the Early Days"-1 (Vol.V.3) by Mr. J. C. Willis, which is taken from a Circular published by the same gentleman early in 1898, about the time whence the rubber cultivation in Ceylon may be dated; and "Rubber in the Early Days, i.e. Caoutchouc or India-rubber, by J. Parkin, 1899" (Vol.V.3). This gives Circulars Vol. I, 12, 13, and 14 in a condensed form.

An interesting circular that appears for the first time is Vol. V. 1 "The Tea Plots at the Experiment Station, Peradeniya," which compares results from the use of *Crotalaria*, *Dadap* and *Albizia* as green manures.

Scientific Officer's Papers.

XXVII.—REPORT ON A TOUR IN COCHIN AND TRAVANCORE.

Leaving Bangalore on 24th January I started on a tour in South Travancore and Cochin, and visited a number of Rubber estates, and also some Tea estates in the hills of S. Travancore. I attended a Planters' Association meeting at Quilon on 29th January and gave a short address dealing with the more important local agricultural matters.

On 15th February I left Cochin and returned to Bangalore, proceeding a few days later to South Mysore to conduct some experiments in the cross-fertilisation of hybrid coffee.

On 24th March I resumed my tour and visited the Mundakayam district and saw a number of the Rubber estates there. On 2nd April I attended a meeting of the Mundakayam Planters' Association and lectured on the diseases of rubber and important points connected with its cultivation.

Leaving the next day, I proceeded to Peermade and Central Travancore and made a tour of the Tea estates, ending by attending a meeting of the Central Travancore Planters' Association on 9th April and lecturing upon the treatment of *Helopeltis* and the manuring of Tea. I finally returned to Bangalore on 13th April.

RUBBER.

Without making any distinctions between one estate and another, or one district and another, I may say that I was very much struck by the appearance of the Pará rubber throughout the whole of my tour, and can congratulate the planters as a whole on its excellent prospects. I had the pleasure of visiting the far-famed Palapilly estate, which is without doubt a most successful piece of rubber cultivation in every way.

DISEASES.—As is the case with all cultivations of one plant on a large scale, and over a large area, diseases are present. This is to be expected, indeed it would be a very remarkable thing were it not the case. Both "Pink disease" and "Die Back" occur, and cause an amount of trouble which varies from place to place. Both diseases are to be found on several indigenous trees in the surrounding jungle, and spores are constantly carried from the jungle to the rubber, which accounts for the annual recurrence of the disease on the rubber. There is, however, no cause for special anxiety. Planters know all about these diseases, and are taking every precaution, and there is no reason to suppose that they will ever be allowed to assume the proportions of an epidemic. Every care should be taken to tackle the disease directly it appears, and a constant watch should be kept for its first appearance. This, in fact, is being done throughout the district. Of the two, the "die back" is probably the more important and the more to be feared, especially if it is neglected.

Quite recently two Circulars (Vol. iv. Nos. 21 & 23) have been published by the Royal Botanic Gardens, Ceylon, written by Mr. T. Petch, the Government Mycologist, dealing at length with the "pink fungus" and the "die back," and I cannot do better than quote Mr. Petch's excellent descriptions of the two diseases. At the same time I advise every planter interested in rubber to obtain these most interesting circulars, and "read, mark, learn, and inwardly digest" every word of them, even down to the scientific names of the fungi producing the diseases.

Pink Disease—*Corticium javanicum*.—Mr. Petch describes this as follows:—"On *Hevea brasiliensis* the disease generally originates at the fork of a tree, or where several branches arise close together from the main stem. The fungus at first is usually superficial, and forms a pink incrustation of interwoven hyphæ over the bark. In its earliest stage it can be scraped

off without injury to the stem. The pink patch gradually extends, and may ultimately cover the whole circumference of the tree and the bases of the adjacent branches, for a length of several feet. Meanwhile, hyphæ from the older parts of the superficial patch penetrate into the bark and gradually kill it, with the result that the dead bark splits and peels away from the wood. The fungus does not enter the wood to any appreciable extent. Its spread is governed largely by the conditions of moisture or exposure; if, for example, the rain water runs down one side of the tree only, the fungus may be confined to that side; and similarly it will exhibit greater growth on the more shaded side. The amount of damage done before the disease is noticed depends upon the size of the tree; young stems about two years old are quickly encircled and ringed, but on older trees the patch should be detected before it has grown completely round the tree.

"The pink patch is extremely thin, and, when old, splits everywhere in lines more or less at right angles to one another. For this reason, it has been called the 'Writing fungus' in Malaya, the fragments being thought to resemble hieroglyphics. Old specimens lose their pink colour and become ochraceous, or, when very old, are bleached to white.

"On six-year old Hevea in the wetter rubber districts the fungus, if not attended to, apparently grows continuously and kills off the bark uniformly. The side branches at the point of attack are ringed and thus killed, and the bark of the main stem peels off in large patches. Between the dead bark and the wood insects of various kinds are found, but these have merely taken refuge under the loose bark. In the drier districts the fungus stops growing soon after the rains cease, after killing off the side branches and part of the bark and cambium of the main stem. This leaves an open wound over which there is no cambium to produce new wood and bark.

"The disease is conveyed from tree to tree by spores which are no doubt blown by the wind. It begins in the fork of a tree, or where several branches arise more or less in a whorl from the main stem, because such places are kept damp by the rain water which flows over them and afford favourable conditions for the germination of the spores. The pink patch, which is at first composed of interwoven hyphæ addressed to the bark, soon develops short cylindric cells (*basidia*) closely packed together, standing perpendicularly to the basal hyphæ. Each of these basidia bears four minute spores at the outer end. The spores are thus produced on the surface of the pink patch, ready to be blown elsewhere at the first opportunity."

The disease is always apparent soon after the monsoon has begun. In the dry season the spores are present, lying dormant on the trees in convenient places such as the forks of the branches, which is a very common point of attack, waiting only for the rain to supply them with sufficient moisture to start them into growth.

This suggests the possibility of a preventive method of control. Copper sulphate is a well known fungicide, and its presence kills growing fungi. If then during the dry weather the trees can be coated with this fungicide, when the rain comes the spores will germinate in its presence and be killed. The spores are blown about in the dry season, and the fungus grows during the Monsoon, the production of spores being its final stage at the beginning of the following dry season ready for redistribution. Presumably then there are few or no spores being carried about in the monsoon and if those *in situ* are killed by copper sulphate as they germinate the rubber should be free from the disease for a year. This is the method "on paper." In practice it needs an experimental trial, and at Palapillay it is undergoing

this trial. Every tree was during the dry weather painted as far as it could be reached with Bordeaux Mixture made up with gum to make it stick. I am informed that the work was not difficult; and the cost was small. The result as far as the protection of the trees from disease is concerned will not of course be known until after the monsoon. I hope at a later date, with the permission of Mr. Nicoll, to publish fuller information about this method and its results.

The disease appears to attack trees from two to five years old more than older trees. When it is found the affected part should be cut out. In the case of quite young trees they should be cut back well below the affected part. On old trees the diseased part should be cut out, and carefully collected and burned. The wound should then be tarred, care being taken to apply the tar to the cut and not to spread it over the bark (see Note 14). A still better plan would be to wash the wound first with Bordeaux Mixture and to tar it afterwards. A watch should be kept on all treated places to see that the new bark is healing up properly, and that all traces of the fungus have been removed.

If this work is consistently done and a watch kept, especially at the beginning of the wet weather, for the first appearance of the disease, there is no reason to fear the disease.

It would be interesting to know exactly what trees in the jungle are attacked by *Corticium Javanicum*, and these being known it would obviously be an advantage to eliminate them if possible from the borders of the estates.

Die Back Disease.—Mr. Petch describes this as follows:—"The fungus which begins the disease attacks the leading green shoot. The place attacked becomes dark brown, and this discolouration gradually extends over the whole shoot, while the leaves fall off as the fungus reaches them. The brown patch is frequently rather soft, but it hardens up afterwards and turns gray. It seems to be a universal rule that the fungus does not attack the shoot at the apex, but at about the middle of its length, and the brown discolouration then extends upwards and downwards. The colours assumed by the dying shoots are not distinctive; any dead Hevea shoot, whether killed by wind or disease, will turn gray; but the progress of the discolouration from the middle of the shoot appears to be peculiar to the true fungus 'die-back.'

"The fungus which originates the disease produces its fructification immediately beneath the epidermis on the dead shoot. The epidermis is slightly raised in very minute swellings which afterwards burst at the top and liberate the spores, leaving minute holes which make the shoot rough. If the diseased shoot is kept moist in a glass dish, the spores are seen to be pushed out from the invisible fructifications in thin tendrils which may be either pink or white. This fungus is a *Glæosporium*, and has been named *Glæosporium alborubrum* Petch. It is quite a microscopic species, and has no features which could be noticed in the field, such as *Fomes Semitostus* and *Corticium Javanicum* have.

"If the dead top shoot is cut off, the tree sends up a new leader from the uppermost remaining bud, and the disease is thus got rid of with very little damage to the plant. But if it is neglected, the 'die-back' frequently continues down the stem until it reaches the root and the tree is killed outright. Of course, if it is discovered at any stage during this further 'die-back,' the stem may be cut off below the dead portion and some part of it at least is saved. As a rule, the disease on young trees has been found comparatively early, and very few have been lost altogether. It is not, therefore,

a very serious disease in the case of young trees, provided that they are not left to take care of themselves.

"This further 'die-back' of the woody stem appeared at first to introduce difficulties which prevented the acceptance of the *Glæosporium* as the cause of the disease. *Glæosporium*, as a rule, attacks green soft tissues; many of them are found to cause rots in ripe fruit, e.g., mango. It is improbable that a fungus of this character should kill off a thick woody stem, and its fructification is not to be found on the fully developed stem of Hevea. But the explanation of this further 'die-back' is fairly simple. After the death of the leading shoot, another fungus, which lives on dead Hevea and can attack living stems through wounds, may enter the dead shoot and grow downwards in the woody stem, gradually killing it down to the base. Of course, this further development is not universal, and when it does not happen, 'die-back' is negligible.

"This secondary fungus is *Botryodiplodia elastica*. Though it does not, as far as is known at present, enter the tree until the top shoot has been killed, it causes far more damage than the *Glæosporium*. The death of the woody part of the tree is entirely due to the action of this *Botryodiplodia*, and it is the only fungus observable in advanced cases of 'die-back.' It proceeds down the tree both in the wood and the bark, but chiefly in the former. Both are blackened by the mycelium of the fungus, and the cambium becomes a black film on the surface of the wood. In early stages the cambium is converted into a black or dark brown slimy layer, but this subsequently dries, and the bark may crack and peel off. The fructification is produced in the bark. It is a small black sphere about one hundredth of an inch in diameter, filled with spores. If the bark is shaved away carefully these spheres are cut across and appear as black circles with a white centre, the spores appearing white when immature. The spheres frequently occur close together and united into a continuous mass; this occurs especially when they develop in cracks in the bark, and in such cases they may form a projecting swollen cushion. The spores are extruded from the spheres when ripe and cover the surface with a fine black powder. In dry situations this powder may be white at first, but in its fully developed form it is black. When examined under a microscope the spores are found to be oval with a transverse wall across the middle: this is the characteristic *Diplodia* spore. In this case also the fungus is microscopic, its spores, which serve for identification, being only about one thousandth of an inch in length and half that in breadth. It cannot therefore be readily identified by the planter, though if he possesses a microscope he can soon become acquainted with its spores."

Trees attacked by this fungus, or, strictly speaking, combination of fungi, must be treated by cutting off the branches affected well below the dead part. All dead material which is cut off should be burned to destroy the spores on it, which will otherwise be produced and blow about and infect other trees. The *Botryodiplodia* fungus will grow on dead Hevea wood lying about, hence it is important to clean this up and not to have any more dead rubber branches, &c., lying about the estate than can be avoided.

Botryodiplodia is known to attack a large number of different plants, and it is undoubtedly present in the jungles of S. India. Consequently it will be quite impossible to eradicate this disease; a careful watch must be kept for it and it must be promptly cut out and burned whenever it is seen. Of course all the cuts made must be carefully tarred over as in the case of "pink disease."

(To be continued.)

RUDOLPH D. ANSTEAD, *Planting Expert.*

Notes and Comments by the Scientific Officer.

32. *Railage and Fertilisers*.—Mr. J. Bernard, of Messrs. Parry & Co., gives some valuable advice about the quantities of fertilisers which should be ordered to obtain the full benefit of complete waggon loads when the goods have to be transferred from one line to another. He writes me as follows :—

“ There is a very considerable difference in rate per ton for consignment weighing less than the minimum waggon load and the rate per ton for waggon loads. The minimum waggon load on the broad gauge section of the M. & S. M. Ry. is 12 tons, and on the broad gauge section of the S. I. Ry. it is 14 tons, and to benefit to the full extent by the rates for complete waggons it is necessary when ordering fertilisers to bear in mind the routes over which the goods will have to be carried, and order quantities accordingly. On the M. & S. M. Ry. waggons are provided to carry any load between 12 and 19½ tons *at waggon rates*. S. I. Ry. broad gauge waggons have similar carrying capacity, but the minimum waggon load being 14 tons, 12 tons pay as for 14 tons.

“ Thus, for consignments to benefit fully by waggon scale rates they must be of such weight as can be made up of loads varying 12 to 19½ tons on the M. & S. M. Ry. and 14 to 19½ tons on the S. I. Ry. If quantities are ordered as above, change from broad to narrow gauge does not affect the rate per ton (*vide* Madras and Southern Mahratta Railway Goods Tariff Part I No. 2 page 37 (i) reading.

“ In booking goods from or *viâ* a Broad gauge station to or *viâ* a Metre-gauge station and *vice versâ*, the waggon Schedule rates are applied according to the description of the waggons (Broad or Metre) used at the forwarding or Junction station, irrespective of the number of waggons of the other gauge into which the contents of the former may be transhipped and carried forward.”

33. *Scale on Pará Rubber*.—Specimens of a shiny black insect on young shoots and leaf stalks of *Hevea* have been received. The same scale has been noticed on the leaves and young shoots of Ceará rubber.

This scale has been identified by Mr. E. E. Green, the Entomologist for the Ceylon Government, as *Lecanium nigrum* : another species added to the list of *Lecanium* pests on Southern India Estates.

(See Notes and Comments No. 4.)

Mr. Green writes, with reference to this scale, “ It occurs not uncommonly on the leaves and young stems of *Hevea* in Ceylon, but has never shown signs of developing into a serious pest.”

It should, however, be carefully watched and should it show any signs of becoming a pest here it should be promptly sprayed.

(Signed) H. C. WESTAWAY,
Honorary Secretary.

—:o:—

In a letter to the *Times of Ceylon* a planter writes :—“ Some of my coolies, who have just returned from South India, complain about the way they are harassed, both at Tataparai and Ragama, by the peons and other underlings. They say they are worried for bribes from Tataparai onwards. It seems a case of a rupee here and a rupee there the whole way over. If such is the case, and it becomes known on the Coast, it will be even more difficult than at present to recruit labour direct from South India.”

DISTRICT PLANTERS' ASSOCIATIONS.**Anamalai Planters' Association.**

Abstract from the Proceedings of Meeting of the General Committee, held at Valparai Bungalow on Wednesday, the 16th March 1910.

PRESENT :—Messrs. G. L. Duncan, (Chairman), C. R. T. Congreve, A. H. Sharp, E. W. Simcock, G. A. Marsh, and C. H. Brock.

1. *Honorary Secretary*.—The Chairman and the Vice-Chairman agreed to attend to the affairs of the Association pending Mr. Simcock being able to take up the post of the Honorary Secretary.

The Meeting expressed its thanks to the Chairman and Vice-Chairman for undertaking the business of the Association in the meantime.

2. *Abkari*.—Read letter from Mr. Simcock, dated 18th February, 1910, giving further particulars with reference to neglect of duty on the part of Abkari peons. The meeting decided that the Deputy Commissioner be written to, and that the copies of correspondence be forwarded to the Head Assistant Collector, Pollachi.

Cinchona.—Read and recorded letter from the Hon'ble Mr. J. G. Hamilton dated 11—3—10.

4. *Hospital*.—Read letter from the Hon'ble Mr. J. G. Hamilton, dated 13th March, 1910, stating that if a suitable building could be lent as a Hospital, a medical man will probably be allotted on offering the Association's contribution towards upkeep.

Mr. Simcock offered to lend a suitable building for the accommodation of a medical officer until such time as a permanent Hospital can be arranged for.

The meeting accepted Mr. Simcock's kind offer on behalf of the Stanmore Anamalai Tea Estates Company, and recommended that the offer be submitted to Government through the U. P. A. S. I.

5. *Labour Rules*.—Read again Rule No. 1. The Meeting was of the opinion that the question of amending this rule be taken up at the next General Meeting.

6. *Scientific Officer*.—Read U. P. A. S. I's Circulars, Nos. 6, 8 and 9. The meeting was not willing to support the proposed visit of Mr. Anstead to Ceylon, as it considered that such a trip was not likely to add to the experience that he has gained from his work in the West Indies, and that, as it was, there was more work for him to do in South India than he could find time for.

The Meeting recommended that the second year's subscriptions to the Scientific Officer Fund be collected at an early date, and forwarded to the U. P. A. S. I.

(Signed) GEO. L. DUNCAN, *Chairman*.

Anamalai Planters' Association.

Abstract from the Proceedings of an Extraordinary General Meeting, held at Valparai Bungalow on Thursday, 31st March, 1910.

PRESENT :—Messrs. C. R. T. Congreve, A. C. Cotton, H. W. de Salis, R. F. Vinen, and C. H. Brock (Vice-Chairman.) By Proxy.—Messrs. G. L. Duncan, E. W. Simcock, G. A. Marsh and Messrs. T. Stanes and Co. In the absence of the Chairman, the Vice-Chairman presided at the meeting.

2. *Branch Roads*.—Mr. Congreve proposed the following resolution :—“That the resolution passed at the Annual General Meeting of this Association, held at the Monica Bungalow on the 16th February, 1910, on the subject of Branch Roads be rescinded, as it is based on entirely inaccurate

rate information, inasmuch as no grant has been made by Government towards the cost of the construction of the Korangumudi-Kaliandepandal cart road, nor has any Government order been passed in any way undertaking to construct or to pay for the construction of such road."

In moving the resolution Mr. Congreve said that he would like to point out that the resolution had been passed when only six members of the Association were present, none of whom had any connection whatever with the road in question, or were in any way able to know the facts of the case, and although at least one of the Members present had expressed his opinion that the matter should not be pressed until Government had answered the letter and reminders sent by the Honorary Secretary to Government on the subject of branch Roads.

Mr. de Salis stated that Mr. Marsh had previously mentioned in his presence and also told him personally that he had seen a Government order authorising the construction of the road in question, and that this was at the end of November or beginning of December last, when Mr. Connell was in the Hills surveying the said road.

Mr. Congreve replied that he was quite sure that Mr. de Salis was making a mistake, as Mr. Marsh himself knew that no such order had been passed by the Government.

The Chairman said that he thought it was quite immaterial whether such an order had been passed or not. It was a fact that the Board of Revenue had, at any rate, recommended the construction of the road under certain conditions, and Government acknowledged that it was constructing the road, and in this connection he read the following letter from the Secretary to the Government of Madras, Public Works Department, dated 17th March 1910, addressed to the Honorary Secretary :—

"In reply to your letter No. 12, dated 5th January 1910, I am directed to state that a portion of the road referred to under (b) in G. O. No. 266-W, dated 5th March 1907, is being constructed by the Government in the interests of Government Forests and has nothing to do with any question of reconsideration of the orders passed in the above G. O."

The Chairman pointed out that the object of the resolution passed at the Annual General Meeting was not in any way intended to be a personal matter, one Estate to another, but because the framers of that resolution considered that Government had not treated the Association with due courtesy. When Government had considered the question of the branch roads in former years, the District Officials, especially those of the Forest Department, were deputed to consult with the Association to ascertain which road would be most suitable for both Government and the Planters in the District. The outcome of all this was the scheme of branch roads which Government refused to carry out in March 1907. This refusal was made direct to this Association. Now it appeared, in the light of the letter which had been read, that Government, without consulting this Association and without even intimating its proposals, had taken out one of the roads from the District Scheme in order to carry out a new little scheme of its own in conjunction with one single Estate. In so doing Government had ignored the existence of the Association which is representative of all the interests in the District, not so much that the Association may wish to give an expression of opinion as to this new scheme of Government roads, but the Association has a right to expect, as a matter of courtesy, to be informed of any new schemes that Government may be carrying out in the District.

Mr. Congreve, in view of the letter from Government read out by the Chairman, then withdrew his resolution.

(Signed). C. H. BROCK, *Vice-Chairman.*

TEA.**The Tea Mosquito.***Helopeltis Theivora*, Waterhouse.

(Continued from issue of April 23, 1910.)

PROCEDURE FOR THE TREATMENT OF THE BLIGHT.

" Under this heading is put in concise form the method above described, which can be recommended for dealing with the blight, being the outcome of our observations up to the present date.

" At the time of pruning burn the prunings while they are still quite green, from all blocks of tea that have shown signs of mosquito blight in the previous season. If it is possible to burn the prunings the same day as they are cut from the bushes so much the better. In the case of light prunings which are difficult to collect for burning, these should be at once hoed into the ground. The immediate cultivation of a pruned area at this time removes all fallen leaves, wigs, undergrowth, etc., which are undesirable in that they may contain either the living mosquito or their eggs. Thorough cold weather cultivation as a preliminary to successful treatment of mosquito blight is clearly indicated. The eggs of the mosquito in prunings lying on the ground produce young insects which can feed on the prunings so long as they remain fresh, and they will afterwards leave them to crawl up the pruned bushes. Prunings remain fairly green and fresh for a long time when lying in drains or on the shady sides of the bushes. Thinning out in pruning and clearing out of the bushes is also necessary for effective treatment of this blight. A wild belt of jungle round the tea area, as also patches of jungle in the tea, should be cut and burnt clean at the pruning season. Bamboo, heavy and scrub jungle in the vicinity of tea, or *Sau* trees and green manure crops grown too closely, causing excessive shade, encourage blight, while sunn-grass, rice fields, and open country are no sources of danger as a general rule. Having taken the above precautions at the pruning season, careful watch must afterwards be kept in every block of an estate for the very first appearance of either the mosquitoes or their punctures in the young flushing shoots. To this end hand-collecting should be started as soon as the garden has been pruned and cleaned up. Whether the insects in any stage are apparent or not on the bushes the hand-catchers should be kept at the work as the destruction of a few insects at this time of the year may ward off the blight altogether. Otherwise, if not destroyed, these first few insects will very rapidly multiply, a single pair producing several millions of insects in the course of a few weeks under favourable weather conditions. Wherever the hand-catchers find insects or fresh punctures in the bushes a stake should be planted to denote the place, and these visited as frequently as possible. Besides hand-collecting the insects it is then necessary to spray the affected bushes, taking care to ensure complete saturation. The stakes planted by the catchers are quickly seen by the sprayers and when the blight has only just appeared it should be found possible to complete the round of a garden spraying only the affected bushes every two days at least. The amount of labour employed must be regulated according to the size of the garden and affected area in order at first to get round once or twice a week and later in the year as frequently as possible, if a large area becomes affected or the insects cannot be entirely eradicated. In the early part of the season while the number of individually blighted bushes and patches are small, complete saturation of the affected bushes can always be carried out at each round of spraying, but later when the blighted area may become larger and it is found impossible to complete the round of the garden in, the

requisite time, with the available labour, complete saturation will have to be partially abandoned. It is suggested in this case that the surfaces only of the bushes be thoroughly wetted so that the round can be quickly accomplished and a fresh start be made on the next. The class of sprayer found most suitable for the treatment of mosquito is such as has a powerful delivery which has the effect of a knock-down blow to the insects. Those which are fitted with a nozzle emitting a nebulous spray are undesirable for the purpose. Besides knapsack sprayers and small portable pumps of the standard type, the more economical watering cans fitted with fine roses will be found of use on occasions when the surfaces of the bushes only are to be treated in order that the several rounds of the affected areas may be completed more rapidly. The pumps used for the experiments described in this pamphlet were small portable 'Standard' pumps fitted with Senecca or Hockley nozzles, and knapsack sprayers of various types. The former were found to be by far the more suitable for the treatment of mosquito blight."

Bar Soaps Recommended.

To what is said in the pamphlet may be added that Mr. Antram recommends two cheap Bar Soap Insecticides :

"Imperial Bar," from the Bengal Soap Factory, at Rs.5-10 per box of 45 lbs. nett at Calcutta.

"Bengal Bar," from the Indian Soap Co., at Rs.5-2 per box of 45 lbs. nett at Calcutta.

Bulletin No. 7 issued by the Department of Agriculture, Federated Malay States, is on Coffee Robusta, by W. J. Gallagher, M.A., Director of Agriculture, F.M.S. It concludes as follows :—

A desirable catch-crop should be a crop yielding a good profit; it should not be too severe on the soil; it should bear early; it should admit of weeding so as to leave the land in a clean condition when it is taken out.

Tapioca has been tried and is hardly a success. In fact it is quite undesirable. . . . Camphor allows the land to be kept clean, but the time to wait for a crop is too long and then the profit is not much. Coffee Robusta offers by far the best catch-crop. A small return will come in the second year and a good one in the third and following years.

Therefore for those who must put down a catch-crop it is undoubtedly the best. The production of robusta costs less per picul than liberica. The total cost of production should not exceed \$12/- a picul, which returns a profit of \$6/- a picul on an average price of \$18/- a picul. Planted as a catch-crop in the way already recommended, *i.e.*, about 1,000 to the acre, a return of 10 piculs of market coffee ought to be obtained by the end of the fifth year. This would yield a profit of \$60/- or over \$130/- at present prices.

These figures are conservative judging by the example already given from Java. In the F.M.S. we have not sufficient data on which to base close estimates; but it is evident that if the entire capital cost of the rubber cannot be recovered, at least from the end of the second year it can be more than upkept from the profits on robusta.

It must be remembered that the cost of planting the coffee has to be added to the cost of bringing the rubber into bearing, but on the other hand owing to the earlier shade the weeding will cost less than in Pará alone.

When rubber has been interplanted in liberica it is a common fault to let the coffee practically die out. This should be guarded against when the time comes to deal with robusta. Large robusta of five years old will compete seriously with Pará. The robusta should be ruthlessly cut out as soon as the branches of the rubber trees meet and certainly in the beginning of the sixth year.

THE INDIAN TEA ASSOCIATION.

Programme of the Scientific Department.

Dr. G. D. Hope, Scientific Officer of the Indian Tea Association, has submitted the following programme of work of the Scientific Department for the coming season :—

In the following programme the investigations, which it is proposed to take in hand this season and continue during the next, are indicated in outline. The details of the programme will be more easily followed if described under the heading of subjects than if the work which is to be relegated to each Scientific Officer be stated separately. The special feature of the work of the present season will be a continuation of the experiments which were begun last season on the manufacture of tea. It having been decided that the experimental area at Heeleaka is no longer to be retained by the Department, the Assistant Scientific Officer will have his hands free during the present season to take up the question of manufacture unhampered by the routine work of conducting garden experiments. In order that as much progress as possible may be made in this direction the Chief Scientific Officer proposes to work at Heeleaka in conjunction with the Assistant Scientific Officer for several months during the manufacturing season. The work of the past season has emphasised the difficulty of drawing conclusions of practical value from the results of experiments made with tea machinery working under actual factory conditions, without previous determination, by means of experiments which permit of more accurate control than is possible in a factory, of the separate effects of the various factors which come into play. These are so many, and such difficulty is experienced in recording accurately the conditions to which the leaf has been subject; that it has been impossible to indicate definitely, from the results of experiments made hitherto, the procedure which should be adopted under given circumstances in order to get the best results. It has been decided, therefore, to devote the earlier part of the season to carrying out experiments in manufacture in the Heeleaka laboratory on as large a scale as is compatible with accurate control of conditions. For this purpose special apparatus will have to be designed and set up, and this question is now under consideration. Having in this way obtained information as to the effect on the leaf, *e. g.* of firing at high or low temperatures, drying in partially saturated or dry air, under increased or diminished pressure, &c., the conditions which obtain in various types of firing machine would be more thoroughly understood and their results more easy of interpretation. As soon, therefore, as laboratory experiments give indications pointing clearly in any direction the question will be further investigated by reference to machines of recognised types. During the present season it is not likely that it will be possible to extend investigations beyond the immediate study of the question of flavour: for the experiments which it is proposed to take in hand first are essentially in continuation of those which were made last season when the question of flavour only was taken into consideration. We are of opinion, however, that the method we propose to adopt is likely to afford valuable results if applied also to the study of other factors which have a bearing on the quality of tea. The results of chemical work conducted last season have indicated that valuable data are likely to be obtained if a careful study be made of the influence of external factors on the growth of tea bushes. It appears, for instance, that further knowledge with regard to the mechanical and physical condition of tea soils would throw much light on those unexplained cases, and they are many, when a soil to all appearances fertile proves not to be so. Many cases of this kind can be understood and explained when reference is made to a chemical analysis of the soil, but the exceptions to this are so many that one

is hardly justified in giving an opinion of a soil from the results of a chemical analysis alone. In addition to knowledge of the chemical composition of soil, information as to its mechanical condition, state of division, capillarity, porosity &c., &c., is required. Investigation in this direction will be conducted throughout the season in the Calcutta laboratory. A close study also of soil temperatures and of soil moistures would afford valuable data. The effect of changes in the intensity of the light falling on the bushes has recently been shown to have considerable bearing on the quality of leaf and it would be desirable to measure this factor with more accuracy than has hitherto been possible. It was mentioned in the Heeleaka Report for 1908 that the results which were obtained from the inoculation of the seeds of leguminous green crops with Nitro Bacterine previous to use were not such as to warrant any definite recommendations as to its use. In plot experiments inoculated seed certainly grew better than untreated seed, but this was not the case in the majority of field experiments. Discrepancies in the results obtained were probably due to differences in the nature of the soil on which the experiments were made, for this has an important bearing on the subject. It seems desirable, therefore, to renew investigations in this direction with a view to determining whether on certain soils inoculation of green crop seeds with Nitro Bacterine is likely to be economically profitable.

Mr. Antram has been granted leave for six months from the middle of April. This necessitates an arrangement by which the work of his department can be controlled and as far as possible carried on during his absence. In Mr. Antram's absence his assistant will devote himself chiefly to the study of green fly and to the identification and collection of the insects of different tea districts. Mr. Antram has issued a notice drawing attention to his wish to make as complete a collection as possible of such insects, and asking that specimens may be sent to the Insectarium at Kauny Koori, Silchar. It is hoped that many specimens will be sent. It is felt that during Mr. Antram's absence the best way in which the study of mosquito blight can be advanced is to follow, as closely as possible, the results which are obtained in cases when his method is being adopted, and as much help as possible will be given, especially in the Western Dooars and the Terai, to those who intend to take measures for the prevention of mosquito blight. The Chief Scientific Officer intends to visit these districts more than once during the season. A pamphlet on this subject has just been published, and it is hoped that it will be of use to those who realize the importance of doing what they can to prevent loss from this cause.

It will be the endeavour of the officers of the department not only to get into touch with managers in different districts who are making investigations in any particular lines, but to record and collate the results of such experiments. It is felt that trustworthy data of this nature will not only throw much light on the particular features of the districts in which they are made, but will gauge the applicability of methods which have proved elsewhere to be of value to districts other than those in which they have been established.

Mr. H. N. Ridley, Director of the Botanic Gardens at Singapore, has presented a Cup valued at \$150 for the best smoked Pará Rubber at the forthcoming Agri-Horticultural Show.

From the Malay States sale of a 50 acre Rubber Estate at \$34,000 is reported. The place is said to yield about 2 piculs of rubber per month. Quite recently a six-acre block of rubber about 4 years old fetched an offer of 8,000 dollars, which was refused.

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Hemilecanium Imbricans.

Through the courtesy of Mr. W. L. Crawford the Association has been enabled to send several specimens of the above scale insect to the Entomologist to the Ceylon Government, Mr. E. Ernest Green. One result of the investigations that have followed appears to be a reclassification of the insect—which was originally named *Lecanium imbricans*—as *Hemilecanium imbricans*.

Acknowledging the last of the series of specimens, Mr. Green writes :—

“I have to thank you for a further consignment of *Hemilecanium imbricans*.

“I note that this will be the last lot. I am indeed very much obliged to you and to your planting correspondent for the ample material that you have supplied. This has enabled me to trace the development of this remarkable species from the egg to the mature stage. The only missing link is the male. Mr. Anstead writes that he will personally keep a watch for this stage, whenever opportunity occurs.

“I shall probably publish an account of the several stages of the insect in a forthcoming paper to be published in the Indian Museum Memoirs.

Laboratory for the Scientific Officer.

Under date the 2nd instant the Officiating Secretary to the Government of H. H. the Maharaja of Mysore, General and Revenue Departments, writes :—

“In continuation of this office letter No. R. 4325/Agri. 65—09—4 dated the 22nd December 1909, regarding the grant of the use of a room in the Agricultural Chemist's Laboratory to Mr. Anstead for his work, I am directed to inform you that the cost of fitting up a room and equipping it is too high for Government to undertake and the assignment of a room for any length of time is also found to be impracticable.”

This decision necessitates reconsideration of certain plans, and the Scientific Officer has been consulted as to what should be done. It is hoped that some feasible course of procedure will be devised, for, without a laboratory, close at hand and available at all times, Mr. Anstead finds that his work is crippled and believes that planters are not deriving the full benefit from his services which they might otherwise do.

Scientific Officer's Papers.

XXVII.—REPORT ON A TOUR IN COCHIN AND TRAVANCORE.

RUBBER.

(Continued.)

Cultivation.—My views upon the system of keeping rubber clean weeded have been expressed elsewhere. On many estates cultivated under this system the annual loss of top soil is enormous, and it will doubtless seriously affect the life of the rubber.

The rainfall on a typical estate, for instance, during last year was in May 15·5 inches, in June 33 inches, and in July 33·6 inches. This heavy rain fell on bare soil which had been powdered all through the dry season by constant manual weeding, and the consequence was that tons and tons of the very best top soil were washed away and laid over the surface of surrounding paddy fields. The loss and the evil are usually admitted, and in some cases curious, and often expensive and cumbersome, methods of mounds and trenches, &c., are adopted to try and stop the wash. The simplest method of all is to grow a green dressing instead of weeds, and keep the soil covered. This will not only stop the wash during the monsoon, but it will add humus to the soil both from its own material and by catching and holding the fallen rubber leaves, which on many clean weeded wind-swept estates are blown away and lost, and all the dry season it will keep the soil shaded and moist, bringing the soil water near the surface where it is wanted. A direct experiment showed on one estate I visited that the soil under a covering of *Passiflora* contained in February, after 3 months of dry hot weather, 11% more moisture than the soil which had been kept bare and clean weeded. The preservation of the top soil and the constant addition of humus to it to improve the mechanical condition are most important points, and I am sure that no rubber planter can afford to neglect them. In some districts a thick cover of *Erythrina* is grown, the branches being bent over so that the whole soil is shaded, and covered with a thick layer of mulch, while open spots are covered with a crop of *Passiflora* or *Crotalaria*. Such estates are quite as good as, in fact in one or two notable instances much better than, estates which have always been clean weeded. *Erythrina* will not grow in all districts, possibly because the necessary soil bacteria are not present. If the soil in the holes in which the plants are started was inoculated with a little soil brought from an estate where *Erythrina* is well established probably the difficulty would be overcome. This, however, is hardly a practical method, though it would form an interesting experiment. In districts where *Erythrina* will not grow, Albizzias should be tried, and cut over in the same way as *Erythrina*, and more use should be made throughout the whole of the rubber districts of local leguminous plants like the various indigenous *Crotalarias*, *Cassia hirsuta*, *Cassia mimosoides*, *Tephrosia tinctoria*, *Tephrosia purpurea*, &c.

The starting point for such green dressings is a clean weeded estate. In a new clearing the weeds should be got rid of as soon as possible by rounds of weeding following one another in quick succession so that the indigenous crop of weeds is allowed to seed as little as possible. This is the time to spend money lavishly upon weeding. As soon as the weeds have been got fairly well in hand, which should be at the end of 18 months at most, the whole place should be covered with *Passiflora*, which should be planted out from nurseries in beds down the rows, and cultivated, and hand-weeded till established. This will choke out the last of the weeds, and it can then

be replaced by a suitable legume. Estates treated this way will have a longer future before them, and will, I am convinced, reach a tappable size just as rapidly as places which are kept clean weeded. When it comes to tapping, the yield of latex will be greater from trees grown with a green dressing, because there will be more soil moisture in contact with the roots.

Manuring.—Suitable manures for rubber have still to be worked out, and only direct experiment in the field can determine what will be the best mixture. An analysis of the typical soil on each estate should be made, showing its mechanical condition, and the amount of plant food available in it. This will indicate the kind of fertiliser which will be most suitable, and with this as a working basis experiments varying the amounts of the ingredients and times of application must be made. In the absence of chemical analyses of the soil a complete fertiliser containing 7% of Nitrogen, 8% of available phosphoric acid, and 8% of Potash, will probably be found about right. This should be supplied at the rate of 3 lbs. per tree, in two applications of $1\frac{1}{2}$ lbs. each, in September and March.

Manufacture.—My attention was called to discoloured biscuits, which are sometimes obtained. These dry black and are in several ways unsatisfactory. To assign the exact reason for this would, of course, need careful laboratory study, but I think that the remedy lies in paying more attention to cleanliness of the collecting cups, and the use of disinfectants in the factory. Coagulating dishes, &c., should be kept scrupulously clean, and free from bacteria. When dark coloured biscuits are obtained I advise a general clean up, especially of the collecting cups, and I think that it will be found that this will remove the evil. The question of the most suitable material for collecting cups is one which has not been solved to general satisfaction. Glass is in my opinion the best, as it is so easily kept clean. In Mundakayam, however, a great deal is to be said for cocoanut shells, which are very easily and cheaply obtainable locally and in practice can be easily washed free of latex and kept clean. Each shell when out of use is hung on the top of a stick stuck in the ground against the tree to keep it from being splashed with mud when rain falls.

Many estates which have begun to tap are preparing to erect factories, and in this connection I should like to call attention to the fact that each year as the trees grow older there will be a steadily increasing crop of seed produced.

The demand for Hevea seed for planting purposes will soon be at an end, but there seems to be an excellent prospect of using it as an oil seed. This is a bye-product of the rubber industry which will repay attention, and it should add considerably to the profits, especially when the price of rubber falls, as I suppose it must do in future years.

Hence in building factories and putting down machinery provision should be made in the plans, and in the horse-power of the engines, for the possible future addition of crushing plant, since the best plan of handling the seed will probably be to crush it on the estate, extract and ship the oil, and return the cake, as Pará poonac, to the soil as a fertiliser. I foresee that in the future there are great possibilities in this direction.

TEA.

Helopeltis.—The chief disease of Tea in the districts under review is the Mosquito Blight. In most places, planters are doing the right thing, and seem to have got the disease fairly well under control. I cannot add anything to the advice given by Mr. Antram with regard to methods of controlling this pest, but it must be remembered that in S. India we do not have the cold weather periods of which he speaks. Mr. Antram's recommendations have been printed in the *Planters' Chronicle* from time to time, and his latest advice

will be found in the *Planters' Chronicle* of April 23, 1910, pp. 170-172 and of April, 30th 1910, pp. 181-182. I will make a point of keeping planters informed through the pages of the *Planters' Chronicle* of all advice and information about the control of the disease which may be available from time to time in the future. I quite agree with Mr. Antram that it is important to treat whole areas which lie together at once. In many places where only the small badly attacked areas had been treated the benefit which resulted was small. There is no doubt whatever that spraying, if carried out thoroughly at the first appearance of the blight, is the most successful method of treatment and far better than catching. I was shown place after place where this plan had been carried out carefully and systematically with most encouraging results. In some places the wrong kind of spraying machine is being used. One which delivers the soap solution as a nebulous spray is useless; a powerful delivery is needed, and in places where water is plentiful and at hand an ordinary garden syringe is as good a machine as can be found for the purpose.

In the case of bad attacks where Mr. Antram's advice as to pruning, &c., is carried out I would emphasise the necessity for burning the prunings as soon as possible. Where there is a heavy dew each night, and especially in shaded nullahs, conditions which often obtain in Travancore Tea estates, prunings keep fresh long enough for eggs laid on them to hatch and the mosquito to reach the perfect insect, so that unless the prunings are burned at once, the pest is not being reduced in quantity and insects hatching out will go to unpruned areas which have before been perhaps comparatively free from attack. Under local conditions labour is often short and it is impossible to carry out all the process as laid down by Mr. Antram, but when this is the case and something must be allowed to be left undone, the burnings should not be one of the unavoidable omissions.

Manuring.—As is the case with rubber, the starting point for all manual schemes should be a chemical analysis of the soil. Manuring has a most beneficial effect upon the control of mosquito blight.

Rapid strong growth is induced, which helps the bushes to resist the attack and to recover very quickly from attack. Again, I would recommend the use of leguminous green dressings for tea, and I think that *Cassia mimosoides*, and some of the local *Tephrosias* would prove most suitable plants for the purpose.

At the time of my visit it was difficult to find weeds of any kind, but in Peermade I noticed several likely plants, among others, *Tephrosia tinctoria*, and a dwarf *Crotalaria* which has not yet been identified. I shall be glad to receive at a more favourable period of the year herbarium specimens of likely green dressing plants for identification.

In conclusion, I have to thank the Honorary Secretaries of the various Planters' Associations in the districts visited, for the excellent arrangements which they made for my tour, and individual planters for their kindness and hospitality.

I am gratified to hear that the Rubber planters of Cochin have decided to form an Association, which will, I understand, be associated with the U. P. A. S. I. this year. The importance of such associations cannot be too highly valued, and I would urge upon all planters the benefit of joining their local association and doing everything in their power to make the U. P. A. a powerful body fully representative of the whole of the planters and planting interests of Southern India.

RUDOLPH D. ANSTEAD, *Planting Expert*.

Notes and Comments by the Scientific Officer.

34. *Basic Superphosphate*.—I have received an interesting letter from Messrs. Peirce, Leslie and Co., Ltd., of Calicut, referring to my Note 27 on this subject. As pointed out in that note, this is exactly what we want, and I gladly welcome Messrs. Peirce, Leslie's comments, and publish an extract from their letter for the information of planters. After stating that their price for Basic Slag is round about Rs.60 per ton, rather than Rs.70 which I quoted in my note, they go on to say :—

“We would also mention that the Basic Slag imported by ourselves is apparently of better quality than that you make use of in your comparison. The last lot we imported gave 15.74% Citrate soluble Phosphoric Acid, and we do not recollect any importation we have made of recent years falling below this. In order to arrive at a fair comparison between the two Manures also it is necessary, we think, to consider the price on the West Coast, as a pretty large proportion of the Manures used in the Planting Districts must go up to the Estate from the West Coast. We take it that rail charges from Ranipet to the West Coast would bring up the price of the Basic Superphosphate in question to, at any rate, Rs.52.

Taking a rough comparison, therefore, we think we might reasonably estimate the cost of Basic Slag at Rs.62 per ton and the price of Basic Superphosphate at Rs.52 per ton. We also think we might take the analysis of Basic Slag, as imported by ourselves (and we believe by Messrs. Stanes & Co.), as containing not less than 15.5% Citrate soluble Phosphoric Acid. On these figures we make out the unit value per lb. of Basic Superphosphate as 3.09 annas, against a unit value per lb. for the Basic Slag of 2.85 annas.”

This is excellent, but injustice to Messrs. Parry & Co. I must say that the last analysis of Basic Slag they sent me showed it to contain 18.06% of phosphoric acid, though they do not state how much of this is soluble.

In my former note I purposely took a low estimate of the phosphoric acid content of Basic Slag, and I am glad to find that planters are fortunate enough to be able to obtain such high grade slag at reasonable prices.

The advantages of Basic Superphosphate over Basic Slag, leaving the question of price out of consideration, put forward in Sc. O. Paper XVII must not be lost sight of in this discussion.

35. *Ceará Seed and Ants*.—If Ceará seeds which have been filed do not germinate in the nursery quickly they are apt to be attacked by ants, which gain an entrance through the filed orifice and eat out the whole of the kernels.

A planter, who has been troubled in this way, informs me that he can keep the ants away from his seeds beds until the Ceará seeds germinate by putting fresh coconuts round them. He breaks coconuts in half and puts down four to six of these halves at intervals round each seed bed. The ants devote all their attention to feeding on these coconuts and leave the Ceará seed alone. The ants can be killed from time to time, if desired, by pouring boiling water on the coconuts covered with them.

My informant protects his vegetable seeds, such as lettuce, onions, &c, of which ants are very fond, in the same simple way.

RUDOLPH D. ANSTEAD,
Planting Expert.

DISTRICT PLANTERS' ASSOCIATIONS:

Shevaroy Planters' Association.

IN CONNECTION WITH MR. ANSTEAD'S VISIT TO THE SHEVAROYS.

Proceedings of a Special General Meeting held at Fairlawn Billiard Room, Yercaud, on 28th April 1910.

PRESENT :—Messrs. B. Cayley, F. Carey, S. Campbell, R. Gompertz, Mrs. Gaitskell, Messrs. S. M. Hight, W. W. Hight, A. B. Kundaswamy, E. Large, C. Rahm, W. Reilly, F. D. Short, C. K. Short, A. de'Rosario, and Ch. Dickins, (Hon. Sec. and Chairman).

Visitors :—Messrs. R. A. Jenkins, I. C. S., and Buchanan, Mesdames Short, Anstead, White and Miss White.

THE HON. SECRETARY.—Ladies and Gentlemen,—“It affords me very great pleasure indeed in introducing Mr. Anstead to this meeting. He has kindly undertaken to deliver a lecture to us to-day on Coffee and Rubber, which I am sure, all present will find both interesting and instructive. Mr. Anstead also desires me to state that after the lecture is over he would be glad to answer questions and offer explanations in connection with his lecture.

(The Planting Expert then delivered a lecture, which will be published next week under the letter of “Scientific Officer's Paper, XXVIII”).

After a great deal of discussion and many questions answered by the lecturer, the meeting terminated by a proposal from Mr. R. Gompertz :

“That a hearty vote of thanks be accorded to Mr. Anstead for his very interesting and instructive lecture.” (Hear, Hear.) (Carried unanimously); also proposed by Hon. Secretary :

“That a vote of thanks be tendered to Mrs. F. D. Short, for granting the use of the Fairlawn Billiard Room to the S. P. A. for this meeting. (Carried unanimously).

(Sd.) CH. DICKINS,

Hon. Secy. and Chairman.

Nilgiri Planters' Association.

The Collector of the Nilgiris writes, in a letter dated 9th April 1910, to the Honorary Secretary, Nilgiri Planters' Association, Thia Shola :—

Government state that they are prepared to consider the extension to the Gudalur Taluk of the Malabar Compensation for Tenants' Improvements Act, 1900, if it can be shown that any evil exists which would be remedied by such an extension.

2. I have the honour to request that you will let me know whether planters in Gudalur Taluk and the Oucherlony Valley suffer from the fact that the Act does not apply there and, if so, will give me particulars of specific instances of hardship.

— : o : —

Under section 4 of the Madras Planters' Labour Act, 1903, H. E. the Governor of Madras in Council has been pleased to authorise Mr. Walter Morris, Cherambadi, the Nilgiris, to witness the execution of labour contracts.

INDIAN TEA ASSOCIATION, CALCUTTA.

Extracts from Abstract of the Proceedings of a Meeting of the General Committee held on 19th April, 1910.

Correspondence with Indian Tea Association, London.—Letters of 24th and 31st March from the Indian Tea Association (London), which had been previously circulated, were now ordered to be recorded. The principal subjects dealt with were the following:—

Port of London Authority.—This subject was mentioned in the proceedings of last meeting. Sir James Buckingham now wrote that he understood that although the maximum rate per ton laid down in the proposed schedule for tea entering the Port of London was 3s. 4d., not more than 1s. 8d. would be actually charged, the cost per chest thus working out at a little under a penny. In Liverpool the maximum charged was 6s. and the actual 2s. For exports from London 10d. per ton would be charged, coastwise shipments would be 5d. per ton and transhipments free.

French Import Duty on Tea.—The London Association had been in communication with the Secretary of State for Foreign Affairs with regard to the Import Duty on tea entering France, the rate of duty being 9d. per lb. with in addition a surtax of about 2½d. per lb. The Secretary of State had replied that the occasion did not appear to be a favourable one for pressing for a reduction in the duty.

Madras Agency Tracts.—At the meeting of Committee held on the 25th February last it was arranged to take up with Government the question of the opening out of the Madras Agency Tracts to recruiting. Further particulars on the subject had been awaited since then, and a note was now submitted giving in brief some information in connection with the matter. It was now agreed that a representation should be prepared for submission to the Government of Madras urging them to take the matter into consideration. Copies of the representation were to be forwarded to the Governments of Eastern Bengal and Assam and to the Assam and Surma Valley Branches of the Association, and their support was to be invited.

Labour Rules.—Lists had been circulated to the Committee showing the signatures obtained to the labour rules agreements for the Brahmaputra and Surma Valleys. These showed that the actual signatures in the Brahmaputra Valley represented approximately 59% of the total acreage under tea in that valley, the corresponding figure in the case of the Surma Valley being 35%. Including acreage that had agreed to sign in the event of 75% of the acreage signing, the figures for the Brahmaputra Valley were approximately 69% and in the case of the Surma Valley 64%. It was now mentioned that other agreements were in course of signature and would shortly be sent in.

D. K. CUNNISON,
Assistant Secretary.

T. MCMORRAN,
Chairman.

—:o:—

NEW METHOD OF PREPARING RUBBER.

With reference to a notice in the *Board of Trade Journal* of 24th March relative to a new method of preparing rubber discovered by a Dr. C. de C. Brito in Brazil, H. M. Consul-General at Rio de Janeiro (Mr. R. Casement, C. M. G.) now reports that the Ministry of Agriculture have decided to make a grant of 40,000 milreirs (£2,500) towards the preparation, by the new method, in Amazonas of one ton of "hevea" rubber and one ton of "caucho" rubber. The rubber will then be transported to New York and there sold in the open market to test its value.

OFFICIAL PAPERS.*Report of the Ceylon Labour Commissioner for 1909.*

A retrospect of the past season is not sufficiently pleasing considering the continual cry for labour; the number of coolies passing through the Agencies has been less than those of 1908; the number 35,704 does not include kanganies and children under five years, some 8,926 having accompanied the gangs; last year, 1908, 47,543 were despatched. The Government returns show that 81,376 Immigrants went over to Ceylon, but this includes kanganies and children under five years. During the last few years the conditions under which labour is recruited have been changing and have now rendered the work more difficult; in my opinion this will continue, and as such a large percentage of kanganies who come across to obtain labour have the firm intention of getting it from recruiters, the war of rates has begun, and those Superintendents who must have coolies will naturally pay any rate to obtain them. I have noticed that a great many Superintendents allow too small a rate to ever hope for any success on the part of their kanganies, such as Rs.1, 2, 3, and 5, and numbers have in consequence gone back empty handed. Some Superintendents advance a great deal too much at the start, which is a mistake, except in instances where the kangany is to be trusted. There is no doubt that the activity on the part of the Straits recruiters has acted detrimentally to recruiting for Ceylon, as the advantages held out are far more enticing as regards wages, and still more so the fact of a Free Passage being granted, and no charge at all being made against the cooly who has his name entered up in the Estate Check Roll, and starts with a clean slate. The Indian Planters have been most active in the different recruiting fields, and the attraction of living within a reasonable distance of their villages is for many reasons a powerful one. The scale of pay, too, has risen, and higher advances are being offered and paid. The large recruiters receive advances before they deliver over coolies, a system in vogue with the Straits recruiters, but a great deal of difficulty would arise when the opinion of the Kanganies to whom the coolies are offered differs as to the suitability of the labourers for work in Ceylon. I am prepared to enter into negotiations with some of the well-known men for the supply of gangs of coolies, but Superintendents must send over their own kanganies to receive them when ready, and allow me the option of advancing monies beforehand, but at the same time absolving me from any loss should any occur. Kanganies could, of course, advance money to these recruiters beforehand if Superintendents wished it. I must again emphasize the need for what I have urged previously, namely, a uniform charge for rice, i.e., Rs.4 a bushel and free passages, as it would strengthen the advertisements I issue in the Districts and place Ceylon on a better footing than it now stands. The fact of the new order of things in monthly payments will soon get to be known over here, and when once the evidence of money coming across either with coolies or by money orders to the relatives in the villages is shown, a far better state of affairs will soon set in. The rate of wages in S. India has risen the last 5 years, and unless the advertisements can show an appreciable increase in Ceylon rates, coolies are quite wide awake enough to calculate which are the best to accept. I know that on many Estates wages have been increased, whilst in some every work is paid by results, the system of using names being generally dispensed with. It must be borne in mind that in advocating for better wages I do so owing to the purchasing power of the rupee having been appreciably reduced, which fact prevents the coolies from receiving the same wages as their forefathers did. Again, Sinhalese on Estates receive far better pay than the Tamil

labourer for the same amount of work, a fact not much appreciated by Ramaswamy. The wages of Farm servants in the Presidency range between Rs. 3 and Rs. 13 a month, with many perquisites attached which add considerably to keeping up the good feeling between employer and employees. Landlords and Mittadars are fully alive to the necessity for paying higher wages and issuing advances, otherwise they would not be able to retain the services of their labourers owing to the counter-attractions offered by recruiters from Malaya, Ceylon, S. Indian. Planters, Natal, the Railway Companies, D. P. W. and Agricultural Departments. The wages given generally for field works range from 4 to 5 annas for men, $2\frac{1}{2}$ to $3\frac{1}{2}$ for women, and $1\frac{1}{2}$ to $2\frac{1}{2}$ for children, failing cash payment it is paid at some ratio in kind; cash advances range from 1 to 50. The family or patriarchal system is the best and soundest one, and should be encouraged in every way possible; it helps to consolidate the labour force on an Estate by still keeping in touch with their relatives in the coast.

Some suggestions have been made for securing indentured labour, but after an experience of $5\frac{1}{2}$ years in S. India and 28 in Ceylon, I would most strongly deprecate any such scheme being tried.

The following Scheme is one which would go a long way to securing labour and place Estates on a sounder footing:—

There are a very large number of kanganyas over here who have retired from Ceylon, but who continue to have some interest with their old Estates in many ways. I would suggest that all Superintendents should offer one or two of these men a small retaining fee, paid monthly, at any of the Agencies where they would be registered and a recruiting certificate issued to them; in return for this fee they would have to contribute a certain number of coolies yearly, keeping up a correspondence with the coolies on the Estates, and so enabling the relatives and friends to hear about them and their welfare. These kanganyas would get a Commission paid at the Agencies for each cooly despatched, but they would have to inform the Agent when they would bring in a gang, so that information could be forwarded to the Superintendent who would send a Kangany across to fetch them. I have often wondered why this has not been tried, but am pleased to see one Estate has begun the system, which I am convinced will go a long way to solve the labour difficulties. Let Superintendents put themselves in communication with old kanganyas, and they will find the chance of earning a monthly wage paid regularly at the nearest Agency with a commission for each cooly, will be most attractive and readily accepted. The fee would, of course, be stopped should the kangany fail to carry out his promises; the Agency people would have to look these men up now and then to see what they were doing.

I do not know whether Superintendents offer their kanganyas a bonus for every cooly taken to the Estate, but it would in a measure make the transaction more attractive and the kangany more careful when *en route*.

Why not give each kangany and recruiter when leaving for the coast a card on which the rate, wages, bonuses for extra time and work are quoted and signed by the Superintendents: this should be entered in English and Tamil, so that there would be no misunderstanding as to the remuneration obtainable.

The Prospects for recruiting in 1910 are good, and though in some Districts the crops obtained in the early part of 1909 were very good and will enable labourers to carry on with, but the N. E. rains have failed over a large area, and judging from my Agent's report there will be a scarceness felt which should enable recruiters to obtain a fair large number of coolies

than in the past two years. I have just appointed Assistant Agents to all the Agencies in order to enable the Agent to travel in their Districts, visiting the centres and villages where coolies are available, explaining the advantages of emigration to Ceylon, distributing advertisements broadcast, getting into touch with the village authorities and enlisting their sympathy towards the work of the Commission.

The notices explaining that all coolies are monthly servants, and that they can terminate their services by giving personal notice to their employers, will be a great attraction, for up till now it is generally supposed that labourers have to serve for one year at least.

Monthly payment in the coolies' hands by order of the Ceylon Government will be another welcome piece of information which will have a good effect.

I am sorry that I was prevented from travelling out into the Districts as the Motor Car has not been delivered; this is to be much regretted, as valuable time has been lost. Messrs. Finlay & Co's Manager of the Recruiting Department had a Motor Car given him in 1908, and has done a lot of important and useful work in recruiting areas. The Straits Recruiting Department has been very active this last season, more Agencies were opened and their operations are gradually extending everywhere. Large numbers of coolies are obtained from the Telugu Districts and shipped from Vizagapatam and Coconada to Penang.

Recruiting.—Canarese coolies have, I am glad to say, gone across in larger number this year, and there is every prospect of a good recruiting season in 1910. I have opened Agencies at Mysore and Bangalore, and have placed an Agent to assist the coolies when changing trains at Jolarpet.

Telugus continue to emigrate though in smaller numbers. This year on some Estates this class of labourer has settled down and is giving satisfaction; on others, trouble has been experienced with them and desertion has followed. In most cases I consider this due to want of suitable handling, for it must be remembered that this class of cooly is different to the one in the Districts south of Madras and is accustomed to food which the others do not require. I would advise those Superintendents with Telugus and Canarese to send some of the kanganyes to their villages, as labour is plentiful in Mysore and Telugu Districts.

Tin Tickets.—The new Rule, is that the *Coast Agency Committee* have decided that no Commission cards are to be issued to gangs when more than 40 per cent. of the total number of coolies are without tin tickets.

Rates.—In my last report I advocated an A. Form rate of rupees ten a head excluding rail fare and batta, and I still advise this with certain modifications. If the kangany or cooly sent over is a reliable man with influence in his and surrounding villages, I consider Rs. 10 a head excluding expenses a fair rate, but if he intends to obtain coolies through the medium of professional recruiters a higher rate will be found necessary, and about Rs. 15 to Rs. 23 a head excluding expenses might be allowed. As regards preliminary advances this again depends largely on the man. It would be unwise to pay an untrustworthy kangany a large preliminary advance, as experience has shown that, as a rule, these sums are spent either buying property in his village or in riotous living. It is impossible to lay down any hard and fast rule, but for the average man a preliminary advance of Rs. 20 would suffice. In the case of trustworthy men larger advances could be allowed, but the final rate per head to be paid on production of coolies should be correspondingly reduced.

A great many Superintendents have lately sent kanganies across without allowing a preliminary advance on arrival at an Agency. This is a mistake, as so many never appear at the Agencies until they have collected coolies, and nothing is known about their movements. It has been proposed at various times that Superintendents should be sent over here to recruit labour, but I have always pointed out the drawbacks to it such as time required, cost of the trip, which if added to the advance account would considerably raise the cost per cooly; they could not go round the villages and personally recruit, but would have to wait at given places for the labour to be brought in; however, anyone who can spare the time and afford it can easily run across and try.

The Assistant Commissioner when out with the S.P.M.R. Camp at Bangalore attended the United P. A. Annual Meeting there, and was given the opportunity of explaining our system of working. He was well received, and I learnt from a well-known Indian Planter who was there, everyone was glad to learn about our methods, and felt greatly reassured as to the fair and legitimate way the business was conducted.

Notices in Tamil are freely distributed to kanganies, translation of which I now append:—

1. Kanganies before signing the pro-notes and affixing their thumb marks thereto should ask for the details of the pro-note amount and get themselves satisfied that their and the coolies' accounts are correct.

2. No bribe or mamool should be given to Agents or clerks or peons.

3. If any bribe or mamool is demanded, kanganies should at once report to the Ceylon Labour Commissioner at Trichinopoly, or report in person when he goes over to the Agency, dépôt.

There have been complaints against some of the Agents, very difficult to prove, but I was glad to receive them and enquire into them. Two Agents were dismissed, and changes made which, I think, will have the desired effect. Complaints were made as to kanganies not recruiting labour, but in nearly all investigations it was found that the men were not keen on the work, and that others had been successful in the very same places. Some people seem to think that I was sent over to recruit labour, but such was not the case, as the letters of credit to the Madras Government stated that I was sent over to assist and supervise the business of kanganies recruiting labour, and that no change in the system hitherto carried on is intended.

Agencies.—The new Agencies started in 1909 were Bezwada, Mysore Bangalore and Jolarpet, and with these the number is 23.

These have been visited at various periods, and though every effort has been made to keep down house rents, it was found impossible to secure suitable accommodation without paying higher rates. The mileage travelled covered 16,584 miles.

Absoconders.—This part of the business was again very heavy with nearly the same number of cases, and results as in 1908 with liabilities amounting to Rs.35,667. Insufficient addresses led to a lot of trouble and waste of time. The mileage travelled by Agents and Peons was 55,623 miles.

Estimate for the year is Rs.83,156, this includes increase to Assistant Commissioner's salary and general increase to the Agents and clerks, the cost of a Motor Car and Kandy Office expenses. It has been rather difficult to estimate the cost of travelling, as it is hoped to get a large area covered during the year.

I would advise all Superintendents to support the Commission ; it means but a small amount, and though some Estates may not use the Agencies, it helps to advertise Ceylon, and so indirectly benefit them. I find that the kanganies in possession of my recruiting certificate do not get molested, and are able to move more freely than those without. In travelling by rail greater security from extortion and interference accrues to those holding recruiting certificate or Commission cards, whilst from Trichy in the night Mail Train reserved accommodation is booked daily, and peons accompany the gangs of coolies in it to Tataparai; this arrangement is much appreciated by Kanganies, so much so, that those not using the Agencies often beg to be allowed to travel in the same carriages. Many is the time they have been assisted, and so have others partly in the hope that their Dorais would relent and join the scheme, and partly for the sake of auld lang syne.

A great deal of unnecessary delay in despatching coolies occurred during the season which was due to Superintendents not keeping a sufficient balance at their credit, a fact to be much regretted, as detention is disliked both by kanganies and coolies. It seems a mystery to me why Superintendents when sending their kanganies to the Coast cannot estimate the amount required to finance their work, and then pay in the sum with something to spare to Immigration Account, Bank of Madras, Colombo ; the cost of telegrams, extra batta and feeding charges would thus be saved. Some Superintendents remit cheques to me here instead of saving discount charges by paying them into Bank of Madras, Colombo. Superintendents would do well to advise their kanganies when remitting funds to their relatives and friends at the Coast to do so through the Commission ; it is far safer and doesn't cost them anything, some large payments have been made this way this year.

The Banking and Clerical work has been very heavy this year, but the staff worked well and deserve the increase to their salaries, and the Assistant Commissioner and the Head Clerk supported me well.

The work of the Agencies has, on the whole, been fair ; several of the staff are new to the work.

(Signed) NORMAN ROWSELL,
Ceylon Labour Commissioner.

The Revival of the Green Tea Trade.

Commenting on recent minutes of the South Travancore Planters' Association, referring to the question of asking the Indian Tea Cess Committee to grant once again the bonus of six pies per pound on green tea, the *Ceylon Observer* remarks :—

" Now that the green tea question has come very prominently before planters during the past year, and that districts like Travancore are well suited for producing the article if the necessary facilities can be provided, it was natural to find such a body as that above referred to vote unanimously in favour of a request to the Tea Cess Committee to sanction the bonus again. The exports of green tea from Colombo up to Monday (18th) this week were 1,675,644 lbs. as compared with 1,462,275 lbs. to the same date last year. South India, it will be noticed, in the opinion of South Travancore planters, would send some three to four million pounds of green tea to the proposed factory provided the bonus were given again, and would expect to increase this annually during the next five years. . . . We are glad to see any encouragement in the direction of green tea production, as we believe in America it is consumed by a large number of people who are difficult to reach with—or, at any rate, to persuade to change their taste for—British-grown black teas.

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Laboratory for the Scientific Officer.

As the Mysore Government have refused to allow the Scientific Officer to the Association to make use of a portion of their laboratory at Bangalore, as the Indian Institute of Science is not likely to be able to provide accommodation of this kind for many months, and as the laboratory of the College of Agriculture and Research Institute at Coimbatore is too distant from head-quarters to be conveniently used, the question of providing a special laboratory for Mr. Anstead is under careful consideration.

Mr. C. K. Pittock writes :—"With regard to what Mr. Anstead writes about my laboratory—my laboratory, such as it is, is always at the disposal of Mr. Anstead and no grant is necessary to enable him to use it; if, however, the Scientific Officer required any apparatus and chemicals which I have not got, it would be very desirable they should be bought for him by the U. P. A."

He adds :—"I am strongly of the opinion that the question of a laboratory, or the use of a laboratory, for the Scientific Officer and one easily get-at-able is of paramount importance and should not be left over till the Annual Meeting."

A very similar opinion has been expressed from Coorg.

Olpehona.

Mr. H. P. Hodgson writes :—"With reference to the Hon'ble Mr. J. G. Hamilton's letter of the 18th April 1910, I understand that any arrangement between planters and the Government must be on a commercial basis.

"I would suggest that if on the one hand the Government will consent to buy bark up to their requirements at a minimum rate of 1 anna per unit that planters should agree to give Government the first offer of their bark at rates up to a maximum of 2 annas per unit. This would ensure to Government a supply of bark within a maximum of 2 annas per unit should bark rise above that price either through a combination of Java planters, or from any other cause, and would enable planters to retain their plantations instead of rooting them up to plant a more profitable product.

"In my opinion from a commercial and economic point of view this would constitute a fair basis of agreement. I should be prepared to enter into such an arrangement for my estates on the Nilgiris and Anamalais."

Scientific Officer's Papers.

XXVIII.—LECTURE DELIVERED BY R. D. ANSTEAD, B.A.,
Planting Expert, at a Planters' Meeting held at Fairlawns, Vercaud,
on 28th April, at 2 p.m.

Since last I had the pleasure of addressing you, nearly a year ago, I have visited nearly all the planting districts in S. India, and am now in a position to compare one with another; I have now got an idea of the local conditions in each district, and the local difficulties and insect and fungoid pests. At the annual meeting of the U. P. A. S. I. to be held next July, it must be decided which of the numerous problems I am to take up, since it is obvious that I cannot single-handed deal with them all, and so must necessarily devote my attention to one or two, and meanwhile the others must wait, either till I have time to work them out, or until the U. P. A. obtain more scientific help. This meeting of the U. P. A. will for this and other reasons be a rather important one, and I hope that the Shevaroyis will take steps to be well represented at it, and will send as many delegates as possible.

I have been asked to say something this afternoon about the possibility of growing hybrid coffee, and breeding new varieties. I think that this is a most important problem which ought to attract the attention of all practical coffee planters. A tree with a better yield, a better quality of coffee, and one which will be more or less resistant to leaf disease, borer and black rot, is the goal to be aimed at. Results which have been obtained by crossing Arabian and Liberian coffee and growing plants from selected seed of this hybrid are decidedly encouraging. The plants form large, sturdy bushes, which give in some instances a big yield. Moreover—and I consider this the most encouraging point of all and quite sufficient inducement to continue the work—without any other gained advantages—they are almost entirely free from attack by leaf disease and black rot. In my opinion improved quality of coffee is to be gained along lines of breeding—and in this way only. With regard to this, the Hon'ble Mr. J. G. Hamilton, our Planting Member, who has been experimenting with hybrid coffee plants for some years, writing in the *Planters' Chronicle* the other day (Vol. V, No. 13, p. 155) said, "Our standard 3rd generation tree was this year picked for valuation. It had the worst crop it has ever given and only produced 1½ lbs. of cleaned parchment coffee, which was valued at 50s. to 55s. at home. There was also of course some cherry." Now this seems to me a very encouraging result. If the trees are planted 6 x 6 they run at about 1,200 to the acre, and a yield of 4 cwt. per acre—which I take to be a fair crop, is only about ½ lb. of parchment coffee per tree. It is true that hybrids are big plants and there will not be so many to the acre. Say they are planted 10 x 10, there will be 450 per acre; a yield of 1½ lb. per tree is a crop of 6 cwt. per acre, and this Mr. Hamilton says is *the worst crop the tree in question has ever given*. Now let us consider the price. The price of Shevaroy parchment coffee is, I believe, somewhere about 50s., per cwt. on the average, and this hybrid coffee was valued at 50s. to 55s., so that it is quite as good. Moreover it is by no means the best tree that can be produced. Mr. Hamilton, and I consider that it contains too much of the Liberian type, and we have this year conducted some cross-fertilising experiments with a view to correcting this fault, and improving the quality and the price.

I have described the process of cross-fertilising coffee to produce new hybrids in a recent number of the *Planters' Chronicle* (Vol. V, No. 12, p. 126), and I will not take up your time now with repeating this. Should any one present wish to discuss it with me I shall be very glad to give him

an opportunity of doing so. Useful hybrids could, I think, be made by crossing other varieties besides Liberian and Arabian, as, for instance, Maragogipe and Arabian, and the Jamaica Blue Mountain coffee and Arabian.

The drawback is the time it takes to produce a good hybrid and bring it into bearing. This is unavoidable and is a reason for beginning work at once. Such good results have been obtained from plant breeding in other countries with other crops that I am sure the coffee planters of S. India cannot afford to neglect this method of producing trees, which will undoubtedly give them better yields, better quality, and comparative immunity from disease.

I have also been asked to say something about the manuring of coffee. The best method to adopt depends largely upon the past treatment of the soil, and no hard and fast plan can be laid down which will apply to all estates. An important point to remember, however, is that the mechanical condition of the soil must be good and its humus content high in order to obtain the full benefit from mineral fertilisers. This is important when dealing with bare patches which are not covered with a mulch, and, as I pointed out the last time I was here, on these a leguminous cover crop should be grown. The best plants I have seen for this purpose are *Cassia mimosoides* and *Tephrosia purpurea*, both indigenous weeds in South India.

From what I have seen of this and other districts I am also still of the opinion that great benefits are to be obtained from applying Lime systematically and using alkaline rather than acid fertilisers.

I am informed that Ceará Rubber is showing every prospect of success in this district. I am very glad to hear it, and I am very much impressed with the possibilities of this Rubber from what I have seen of it in other districts. The climatic conditions which prevail on the Shevaroyes should suit it very well.

In a plantation of Ceará you will probably find a very great variability between the individual trees both in appearance and in yield of latex. While some trees give a good yield others hardly give any. Those of you who intend to extend your cultivation of Ceará should test your existing trees by experimental tapping, and when you find a really good one, break it up into cuttings and plant your new clearings with these. These will give trees true to type, while seed will not come true owing to the natural cross-fertilisation which goes on between the bad and good trees.

Ceará Rubber will respond to good land and good cultivation just as much as coffee or any other crop, and if it is to be grown seriously every attention should be paid to this. Suitable green dressings for Rubber will be found in the plants already mentioned and also in *Cassia hirsuta* and *Tephrosia tinctoria*, again both indigenous weeds.

Since last we met the *Planters' Chronicle* has been made a weekly publication, and I want you to look on it as a medium of communication between you and myself. I propose to answer questions of general interest through it. I am often asked the same question by two planters in widely different districts and as you will quite understand my correspondence is a heavy one, and this method of using the *Planters' Chronicle* will tend to lighten it a good deal and leave me free to do more useful work. I want you not only to read the *Planters' Chronicle* but to keep it carefully filed for reference; and also to write for it and discuss in its columns agricultural matters of general interest.

In conclusion, I should like, with your permission, to say a word or two about a subject which perhaps, strictly speaking, hardly comes into my sphere, and that is the benefits to be obtained from co-operation. After visiting the various districts of S. India, I am of the opinion that planters do not pay sufficient attention to co-operation. The local Planters' Associations are excellent institutions as far as they go, but every individual planter should be a member of his local Planters' Association and thus make the U. P. A. a powerful body truly representative of the planting interests of S. India. This is, I think, especially important to the coffee planter, who is unfortunately face to face with falling prices and a steadily increasing competition coming from the Western World.

The Cane Sugar industry in the West was some years ago in much the same position, and many were the gloomy forecasts as to its future. What do we find to-day? Central factories using modern labour-saving machinery and capable of handling sugar in a way in which the individual planter could never afford to do, combination of planters to look carefully after the industry and keep abreast of the times in the way of scientific knowledge and practice, the agent and the middleman eliminated and his profits transferred to the grower—in other words, co-operation in its best form.

There is a vast field open for work by Associations of coffee planters in dealing with methods of transport, and distribution and preparation of coffee, and it is only by such combinations that planters can hope to develop to the full their economic power.

RUDOLPH D. ANSTEAD, *Planting Expert.*

The report of the coffee expert (Mr. J. W. Van Leenhoff) of the Porto Rico Experiment Station states:—The yield of the coffee crop as a whole was unfavourably influenced by weather conditions prevailing during the year. The bananas planted as provisional wind-breaks proved to be efficient protection for the young coffee during the strong winds in the beginning of 1908, and also seemed to have greatly benefited the growth of the young permanent wind-breaks planted between the rows. Considerable damage by weevils is reported, especially at altitudes of 2,000ft. above sea level and over, and mainly in the young coffee. Borers have done considerable harm to the guava shade trees in several districts. The coffee leaf miners, although abundant everywhere, appear to be held in check by their parasite.

The experiments in improving an old coffee grove and in establishing a new grove (E. S. R., 20, P. 45) were continued. The yield from the renovated grove was only 2,472lbs. in 1907 as compared with 4,349lbs. in 1906. The average total cost of gathering and preparing 100lbs. of coffee ready for market was \$5'275, and the average price obtained \$11'23. The total expense per acre for the fourth year in the new 3-acre planting was \$12'44 and the yield 214lbs. of coffee. The net cost per acre of this planting for the 4-year period has been \$91'56. The foreign coffees being tested are reported as doing well.

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A COFFEE DISEASE IN GUATEMALA.

Mr. F. H. D'Herelle describes in the *Bul. Trimest. Soc. Mycol., France*, *Phthora vastatrix* n. sp., a fungus which is said to cause a serious disease in Guatemala, being particularly destructive in the plantations on the Pacific coast of that country.

The fungus causes the death of the trees by the hyphæ penetrating and clogging up the sieve tubes and by the destruction of the cambium. It seems to infect the trees beginning with the roots and spreading from them to the trunks.

Notes and Comments by the Scientific Officer.

36. *Discoloured Pará Biscuits*.—In my report on my tour in Travancore the occurrence of black and discoloured Pará Rubber biscuits is mentioned. (*Planters' Chronicle*, Vol. V. No. 6, p. 189). This is a very important matter, and the exact cause of it could only be discovered by laboratory study which would take probably a long time. The probable cause of the discolouration is suggested in my report, and the following article by Mr. Petch, the Government Mycologist in Ceylon, extracted from the *Tropical Agriculturist* of January 1910, pp. 40 and 41, will prove of interest :—

"As the market price of rubber is governed to some extent by its appearance, any departures from a uniform colouration are undesirable; consequently spotted biscuits are frequently sent in for examination and report. Clear red spots in rubber biscuits or crepe appear to be fairly common; the cause of these has not yet been ascertained. Another colouration has just been reported; in this case wet biscuits were covered with black spots, up to an inch diameter, the discolouration extending right through the biscuit. These spots contained bacteria, together with minute particles of a black pigment to which the discolouration was due. It is probable that in this case the pigment was excreted by the bacteria; several bacteria are known to produce black colouring matters in this way. These biscuits had been coagulated with formalin. In another case, the biscuits when held up to the light were seen to be mottled with dark brown patches. These were dark biscuits which had not been subjected to any hot water treatment. In many examples of dark coloured biscuits it will be found that the colour is due, at least in part, to a thin film of brown colouring matter on the under (?) side of the biscuit. In some cases, if the biscuit is sliced into two horizontally, a marked difference will be seen in the colour of the two halves, the upper half being more or less amber coloured, while the lower half, though of the same thickness, is dark, owing to the presence of this brown film. The presence of this film may be demonstrated more clearly by cutting a thin slice through the biscuit and placing it in chloroform or some other solvent under microscope. As the rubber absorbs the solvent and swells, the film on the exterior shows up quite plainly. This film is composed of some amorphous brown substance whose nature has not been ascertained, usually with some yeast cells; and, as a rule, it is spread uniformly over one side of the biscuit. In the case of the mottled biscuits referred to above, the discolouration, which was quite superficial, was due to an abnormal development of this film, and most of it was collected in patches instead of being spread uniformly over the surface. Yeast cells were present in abundance in the sediment obtained on dissolving the rubber in chloroform or carbon bisulphide.

"Bacteria and yeasts appear to be the chief organisms concerned in this spotting of rubber biscuits; of course, moulds grow on the surface, but I have not up to the present observed any effect which could be attributed to them. An exact investigation into the causes of these spots would occupy one or more investigators for at least a year, and would require all the appliances of modern bacteriological research. It would demand a strictly scientific examination, in each individual case, of the fungus and bacterial flora of the collecting cups, the setting pans, the curing house and the water supply, together with experiments to determine which of the organisms found would grow in latex or wet rubber, and their effect on either. But although this problem cannot be dealt with under the present circumstances, it is possible to lay down more or less empirical rules as to the course to be adopted in order to get rid of the cause of these brown or black spots. It is unlikely that the effect is in any way connected with the tree, and it must be assumed

for the present that some organism is introduced into the latex or the coagulated rubber either by the wind or by the water supply. In either case, if the collecting cups, pails, etc., are once infected they will remain infected, and the biscuits will continue to be discoloured, until some method of sterilisation is adopted. Therefore when this trouble makes its appearance, all collecting cups should be boiled and the dishes, pails, etc., scalded with boiling water. It has been found sufficient to do this once, but it would be a wise precaution to scald the dishes and pails periodically, as part of the general routine of the factory. In one instance, that of the mottled biscuits referred to above, this treatment was adopted; and the superintendent writes; "with reference to the black biscuits about which I wrote to you some months back, it may interest you to know that since I took your advice and boiled all the utensils used, and my store thoroughly cleansed, no black biscuits have put in an appearance."

If the infection is introduced with the water supply, the above treatment will not stop it, because the dishes will be reinfected. To determine whether the water supply is at fault, biscuits should be made, using water which has been boiled and cooled, and these should be compared with biscuits made with the unboiled water. Of course, the dishes, etc., must be sterilised before the experiment is attempted, otherwise that possible source of infection will not be excluded. If the water were infected, and no other source of supply were available, more elaborate experiments would be required to determine whether the infection could be avoided.

RUDOLPH D. ANSTEAD, *Planting Expert.*

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A Recent Circular to the Members of the Indian Tea Association reads as follows:—The Entomologist to the Indian Tea Association is anxious to make as complete a collection as possible of every description of insects found in the Indian tea districts and the opportunity is taken of asking planters to send specimens accompanied by notes regarding them to the head-quarters of the Entomological Department.

These notes should state in particular whether the insects were discovered on tea or in its vicinity and should record the date when they were found.

All parcels containing live insects should be sent by the most rapid route and as soon as possible after capture.

Caterpillars should be sent in boxes without over-crowding and should be supplied with leaves of the food plant on which they are found and samples of these plants for identification.

All live insects required a roughened surface to which to cling and, therefore, if these are sent in a tin, a lining of paper or cloth is required.

Insects such as Moths, Beetles, Bugs, etc., when dead, should be folded in paper and packed for the post in a strong covering.

Match boxes will be found very useful for sending a small number of specimens or for minute insects, and can be sent by post in an ordinary long envelope.

Parcels should be addressed to the—

ENTOMOLOGICAL DEPARTMENT,

Indian Tea Association,

Kanny Koory, Silchar, P. O.,

Cachar.

Owing to the fact that the Entomologist will be on leave during part of the present year, a full description of the specimens will not be immediately forthcoming, but their receipt will be acknowledged and a description sent later.

DISTRICT PLANTERS' ASSOCIATIONS.

Mundakayam Rubber Planters' Association.

*Minutes of a Meeting held at Yendayar Bungalow at 10 a. m. on the
30th April, 1910.*

PRESENT :—J. J. Murphy, Esq., Chairman, G. Atkins, Esq., G. H. Danvers Davy, Esq., R. Harley, Esq., R. E. Haslam, Esq., J. N. Hall, Esq., H. C. Plowden, Esq., and J. R. Vincent, Esq., (Honorary Secretary.)

The minutes of the last meeting were taken as read.

Lady Amphyll's Nursing Institute.—Read rules and letter from R. C. Carr, Esq., the Resident in Travancore and Cochin. A fund was started and several subscriptions promised.

European Doctor Scheme.—As some members, who have no medical accommodation, demurred to the scheme as at present proposed, it was proposed by Mr. Vincent and seconded by Mr. Atkins that it be referred to a Sub-Committee to formulate a scheme for attached wards. The Committee were also asked to draw up a form of guarantee to be signed by subscribing estate owners. Messrs. Murphy, Danvers Davy, Atkins, Harley and Vincent were asked to serve on the Committee.

Passed unanimously.

Sri Mulam Delegate's Report. Mr. Vincent, who was delegated to the assembly, reported as follows :—

"I urged the necessity of opening direct communication between Mundakayam and Punalur, and pointed out that Mundakayam was a town growing in importance and the road now proposed would open up large tracts of Government and other lands which were now lying idle. I showed that Government would find this road very useful to work the forests. The second road mentioned was the Kuttikal-Puniyat Road. This road when completed would be only 9 miles long and it would be of much use for the Mundakayam produce, which is increasing every year.

"I also urged the necessity for hospital accommodation at Mundakayam. It was pointed out that the sick people at Mundakayam would be in a very bad position, were it not for the hospitals built and maintained by planters at their own expense. I also asked for grants-in-aid for our own hospitals as it is customary for Government to give these to institutions properly equipped and with qualified men.

"*The Dewan's reply* was to the effect that the question of extending the Mundakayam-Kuttikal road to Puniyat will be considered when the heavy pressure of work now on the P. W. D. is over.

"As for joining Mundakayam with Rani, there is a trace between Rani and Manimalay, and an estimate for converting this trace into a cart road is under preparation. It will be sanctioned when it comes. This will give connection between Punalur and Mundakayam. His Highness' Government do not propose to connect Rani with Mundakayam in the near future.

"The question of providing Hospital accommodation at Mundakayam will be considered.

"I was asked by the Association to try and meet the Dewan and Conservator of Forests with a view to modifying some of the rules in connection with the clearing, measuring, and stacking of Royal Timber. This I did, and am glad to be able to say that the Dewan and the Conservator

"vator were kind enough to promise us the facilities asked for. I may add that these promises have been fulfilled and that there is now no hindrance to our work in this direction."

Under this heading it was proposed by Mr. Murphy and seconded by Mr. Haslam, that the delegate be thanked for his services and that a sum of Rs.70 be given from the Association funds for his expenses.

Passed unanimously.

Mundakayam-Punalur Road.—It was proposed by Mr. Atkins and seconded by Mr. Harley, that the Hon. Secy. be instructed to write to Government, pointing out the advantage of a direct road between Mundakayam and Manimalay not only to the planters but also to the Forest Department.

Kuttikal-Puniyat Road.—The Hon. Secy. was instructed to write and ask Government to put this work in hand as speedily as possible.

Removal of Civil Court from Kanjirapalli to Meenachil. The Hon. Secy. was asked to write to the Dewan, sending a copy of the letter to the Resident, and to ask that he will be good enough to reconsider the request of the planters and Mundakayam merchants, and referring him to the conversation held between himself and the deputation which met him at Mundakayam on the occasion of his recent visit, pointing out to him that with Meenachil as the Civil Court centre, process will be made difficult for everybody in the District. Owing to lack of roads, bridges, and rest houses, and the great distance separating us from the Court, it will be very difficult for us to attend Court at ordinary times, and in the monsoon practically impossible.

Planters' Benevolent Fund.—The Hon. Secy. was requested to ask for payment of last year's subscriptions and to send the rules to owners, Companies, and Managers interested in the District and to ask for this year's subscriptions.

Typewriter for Hon. Secy.—The Hon. Secy., was instructed to write and find out a suitable type of machine and report to the Committee.

Place and date of next meeting.—It was resolved that the next meeting of the Association be held at Kuttikal Bungalow the first Saturday in July.

Mr. Atkins—brought before the meeting the question of a right of way from the Rani Company's Mundakayam estate to Mundakayam, and requested the Association to represent to Government his grievances in this connection. The Honorary Secretary was asked to communicate with Mr. Atkins on this subject with a view to writing to Government.

Mr. Danvers Davy—brought forward the question of power and machinery for Rubber factories, and pointed out the desirability of Planters purchasing, as much as possible, machinery of one type, so that there would be less difficulty with the obtaining and erection of machines and duplicate parts.

Correspondence read—

Kanjirapalli-Errattupetta Road.

Penang and Malacca recruiting.

Mr. Asher's letter re Scientific Officer.

It was proposed by Mr. Danvers Davy and seconded by Mr. Haslam, that F. Hodding, Esqr., the first class Magistrate at Peermade, be elected an Hon. member of the Association.—Passed nem. con.

(Signed) J. J. MURPHY, *Chairman*.

(Signed) J. R. VINCENT, *Hon. Secretary*.

CORRESPONDENCE.**Growth of Para Rubber.**

Kutikul Estate,
Mundakayam P. O.,
Travancore, S. India,
27th April 1910.

From observations made after a series of measurements extending from August 1908 to February 1910 I have come to the conclusion that it is possible to determine very closely the approximate growth of Pará Rubber, growing under normal condition (Low country), one year in advance, thus giving estate managers an opportunity of fairly accurately forecasting the amount of crop obtainable, and the number of tappable trees they will have, one year from date of measuring.

It was in comparing the circumference of trees at the base in August 1908, with the measurements obtained from the same trees at 3 feet from the ground the following August 1909, that a similarity was first noticed. Later on, the basal measurements of other trees were taken and compared with the 3 feet circumference measurements a year afterwards, and these too were found to be similar, showing that, under ordinary conditions, we may assume that the figures of one period's basal measurements will approximate the figures of the same trees at 3 feet from the ground one year later. That this discovery is valuable if proved correct will be self-evident to every estate manager who has to make an estimate of amount of crop and cost of production a year or 6 months ahead.

That this theory holds good on estates at an elevation of more than 1,000 feet is not claimed, and, as far as is known it is only appreciable to estates at a low elevation.

The figures given below are taken from measurements of trees on an estate 500 to 750 ft. above sea level.

Average basal measurements Trees Nos. 1 to 20 August 1908 (Planted 1906)	3 feet from ground measurements from same trees August 1909.
Inches 10'33	Inches 10'02
Same trees February 1909 Inches 12'07	Same trees February 1910 Inches 11'45
Average basal circumference 20 trees August 1908 (Planted 1907)	Same trees August 1909 (Planted 1907)
5'08	6'16
Same trees February 1909 Inches 7'15	Same trees February 1910 Inches 7'13

(Signed) J. R. VINCENT.

DISCOVERY OF RUBBER-PRODUCING TREES IN NATAL.

The Imperial Trade Correspondent at Durban (Mr. A. D. C. Agnew) has called attention to an extract from a local newspaper regarding rubber-producing trees discovered by Dr. Aurel Schultz in the Tugela valley. A concession has been obtained for extracting the rubber. It has been found, according to the article, that a native will gather 12½ lbs. of latex, equal to 6½ lbs. of hard gum, per day, for a wage of ls. and food. About 20 per cent of rubber and 50 per cent. of good resin, it is stated, can be obtained by a secret process of reasonable cheapness. The rubber was priced some time ago by a London rubber expert at from 2s. to 2s. 6d. per lb.

SELECTED CUTTINGS.

Further Experiments with Nitro-Bacterine at Wisley.

Mr. Chittenden reports in the current number of the *Journal of the Royal Horticultural Society* (Vol. 35, Part III., page 391) the results of the trials with nitro-bacterine, which were carried out at Wisley during the summer of 1909.

The plant selected for the inoculation experiments was the French Bean, and the variety used was Canadian Wonder, the seed of which was presented for the purpose of the trials by Messrs. Sutton & Sons, of Reading.

The method of trial was similar to that adopted in the previous years, except that, in accordance with Professor Bottomley's recommendations, a dressing of chalk was applied to the ground. The land was then bastard-trenched; but no manure was added. The nitro-bacterine—that is, the preparation of the bacterium, *Rhizobium leguminosarum*, responsible for nodule formation—was presented by Professor Bottomley.

The results, as judged by the yield of marketable produce, indicate that neither steeping the seed in nitro-bacterine nor watering the soil therewith effects any increase in the crop. Indeed, the highest yield was obtained from a plot which was sown with uninoculated seed and watered with well water.

A comparison of the yields from the inoculated and uninoculated plots gave the following average results:—

Plots inoculated once : produce, 787 grams.

Plots inoculated twice : produce, 727 grams.

Plots uninoculated : produce, 782 grams.

Attempts to increase the yield of non-leguminous crops by the use of nitro-bacterine gave similar negative results.

Putting all the experimental evidence together, we are driven to the conclusion that the nodule bacterium is so widely distributed in the soil of this country that inoculation of sown seed takes place inevitably, and that, therefore, the artificial inoculation of seed with cultures of the nodule organism is a work of supererogation.—*The Gardeners Chronicle*.

—o—

Entomological Notes.

By E. Ernest Green, Government Entomologist.

"GREEN BUG" ON TEA.

Attention was drawn, in the February number of this Journal, to the prevalence of "Green Bug" (*Lecanium viride*) on tea in certain districts. I have since had an opportunity of visiting one of the estates upon which the pest was present. The infested bushes could be detected from a considerable distance by reason of the black fungus that always follows the bug, forming a thick deposit upon the leaves. A similar fungus is associated with the presence of "Brown Bug" (*Lecanium hemisphaericum*), and another bug (*Pulvinaria psidii*) which—in its earlier stages—may readily be mistaken for "Green Bug." All of these scale-insects occurred in the same fields. A closer examination of the bushes showed that the insects were present in very large numbers; but the effect upon the apparent health of the trees was remarkably small, considering the virulence of the attack which has (I was informed) been prevalent for over six months. There was no marked fall of leaf. The older leaves were quite blackened by the

consequent growth of fungus, but the bushes were otherwise vigorous and were still flushing. Moreover, the yield of tea from the infected fields had been well up to the average. On this estate the bug-infested bushes were white-washed immediately after pruning, and the prunings were burnt. This treatment effectually checked the pest for at least a year. Though the bug usually reappeared after that time, its effects were not felt—to any great extent—during the period remaining before the next pruning. Under these circumstances, I do not consider that any treatment is necessary, except at the time of pruning.

As mentioned in my early report upon "Green Bug" (in 1886), lime-water or white-wash is very effective in killing every individual that it actually touches. Dry lime is quite useless. It is the caustic action of the wet lime that is needed. White-wash is usually employed, but clear lime-water (if freshly prepared) is equally effective and easier of application. The cost of white-washing an acre of tea, in a really thorough manner, by means of a brush, is considerable. Lime-water can be applied as a spray. If white-wash is used, the most economical method of applying it would be by means of pneumatic distributor, such as is employed for painting large buildings.

Soapy insecticides may be employed in place of whitewash. In fact such preparations are recognized as of special importance in the treatment of scale-bugs of all kinds. The *Planters' Chronicle*, of February 5th, gives particulars of a wash that has been found useful against "Green Bug" on coffee in India. It is recommended by Mr. A. G. Nicholson, of Coonoor. The mixture consists of 1 lb. bar soap and 1 lb. refined saltpetre, to a kerosene tinful (4 gallons) of water. Mr. Nicholson uses a brand of soap known as "Gossage's Mottled Blue Bar," costing Rs.15.50 per case. The refined saltpetre costs Rs.190 per ton. It is stated that the "mixture" works out at about + to 5 annas per kerosene tinful, according to the cost of carriage to the spot. Mr. Nicholson apparently applies the mixture with a brush, which must be somewhat costly. I would suggest substituting "Imperial Bar" soap for the "Mottled Blue." Mr. Antram (Entomologist to the Indian Planters' Association) reports that this brand is not only the cheapest in the market, but that it forms a mixture quite free from sediment, so that it can be sprayed through a cyclone nozzle without any difficulty.

THE "PULVINARIA" BUG.

This species (*Pulvinaria psidii*, Maskell) has been known to occur on tea for many years. But it usually confines its attacks to individual or small groups of bushes. It is allied to the "Green Bug," but may be distinguished—in its later stages—by the presence of a conspicuous white ovisac, when it resembles more nearly one of the "mealy bugs." In its earlier stages it resembles almost exactly the "green bug," the only noticeable difference being that the latter has a curved series of blackish spots on its back. Both species affect the bushes in a similar manner, and the same remedies are applicable in each case.

A "MEALY BUG" ON *Tephrosia candida*.

I have observed specimens of this plant—now cultivated as a green manure—infested by a mealy-bug (*Phenacoccus iceryoides*). This bug has but recently attracted attention in Ceylon, though I have received it from India, on several occasions. It is one of the largest of its kind and appears to be remarkably prolific. If unchecked, it might develop into a serious

* Since writing the above I have been informed that "in some instances 'Gossage's Blue bar' is cheaper, because of the heavy cost of transporting 'Imperial' from Calcutta to, say, the Nilgiris."

pest. The specimens submitted to me were being preyed upon by the carnivorous larvae of a small butterfly (*Spalgis epius*) ; but it would not be wise to trust entirely to natural enemies which are uncertain in their action. The pest is a conspicuous one and cannot well be overlooked. The insects congregate upon the stems of the plant, covering them thickly with hemispherical masses of white mealy secretion which conceal innumerable eggs. Affected plants should be cut out and burnt.

THE "PADDY FLY" (*Leptocrisa acuta*).

Mr. Driberg sent me a report from one of his Agricultural Instructors, giving particulars of experiments with a sweeping net against Paddy flies (as suggested by Mr. Lefroy). The treatment appears to have been effective, as—after the use of the bag—no more insects could be seen in the field.

Mention is made of two varieties of paddy ("Burma Drought-resisting" and "Kiushu") that were very severely attacked, and of one variety ("Thillainayakam") that appeared to resist the pest. Such observations are of great importance and should be carefully collected. It may be possible to breed a strain that will combine the resistant properties of "Thillainayakam" with the more valuable qualities of some other varieties.

It has been suggested that the immunity of "Thillainayakam" paddy is due to the fact that "this variety has the peculiar tendency of flowering during the midday (at which time the flies take shelter at the bottom of the stalks) and of closing up by 2-30 or 3 p.m., before the flies come up. This explanation requires corroboration, firstly as to the statement that the flies take shelter at midday; and, secondly, as to whether this opening and closing process is continued each day during the ripening of the crop. Damage to the grain does not usually occur at the time of flowering, but later, when the grain has begun to form and while it is still soft and milky.

A BLOOD-SUCKING BUG.

A correspondent has sent me specimens of an evil-looking bug which had been gorging itself at his expense. It is quite distinct from the notorious "B-flat" (or bed-bug—*Cimex lectularius*), though it has acquired the same objectionable tastes and habits. The examples first received were small and immature, but their bodies were fully distended with blood. My correspondent reports that he was disturbed at night by the bites of these creatures and found several of them crawling about the bed. The consequent irritation was severe. Subsequently the adult insect (probably the parent of the troublesome brood) was discovered in the same situation. It proves to be a Reduviid bug (*Conorhinus rubrofasciatus*), an insect of quite formidable size, measuring over an inch in length.

Bugs of this family normally prey upon other insects; but several species of *Conorhinus* have gained an evil reputation as systematic blood suckers. *C. sanguisugus* is a troublesome domestic pest in parts of the United States. Darwin, in his "Voyage of the Beagle," describes a species of *Conorhinus* that attacks travellers when camping out on the Pampas of South America. As far as I know, the present record is the first of the kind from Ceylon. The insects frequent outhouses, hiding amongst the rafters during the day time and sallying out to feed at night.

THE COLOMBO LAKE FLY.

I have at last received the scientific name of the notorious "Lake Fly." It can now be definitely labelled as *Chironomus ceylanicus*. I fear, however, that this knowledge will not appreciably mitigate the inconvenience occasioned by the pest.—*Tropical Agriculturist*.

The Planters' Chronicle.

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(INCORPORATED.)

The Annual Meeting, 1910.

August 1st has been suggested as the opening day for the next Annual Meeting, but no date has yet been determined upon. District Planters' Associations have been asked to state what subjects they wish to bring up for discussion, and it is hoped that there will be a goodly attendance of delegates and visitors. Labour matters are still to the front, and though it may prove to be a case of *tot homines tot sententiæ* a thorough discussion of Labour problems is desirable. As, moreover, a definite programme of work for the Scientific Officer must be drawn up, and arrangements made for the management of the S. I. Planters' Benevolent Fund, the Annual Meeting of 1910 is likely to be more than ordinarily important and interesting.

Laboratory for the Scientific Officer.

To make sure of convenient premises being available in the event of it being decided to give the Scientific Officer a laboratory of his own, the premises adjoining the U. P. A. S. I. office—which open into them and were formerly a part of them—have been rented for the months of June, July and August. This is merely a temporary arrangement, made for the purpose stated. The question of providing Mr. Anstead with a laboratory can now be considered and settled either before or during the Annual Meeting in the knowledge that if the decision is in the affirmative the premises will be available forthwith, whereas if it is in the negative they can be relinquished, and only a small sum paid for rent will be lost.

Bordeaux Mixture.

With reference to Scientific Officer's Paper XXIX, printed in this issue, there is a note that could not be conveniently embodied in it, and this, therefore, is given here. In the fifth paragraph of the quotation from Mr. Gudgeon's letter reference is made to a plant called locally *Kola Mavoo*. Balfour, in "The Timber Trees of India," spells the name *Kola Mavah* and names the tree thus:—

ANACARDIUM OCCIDENTALE, Linn.

ACAJUBA OCCIDENTALIS, Gaertn. CASSUVIUM POMIFERUM Lam.; Rheede.

The Cashew-nut tree:—*Kola mavah*, Tam.; *Mundiri maram*, Tam.; *Jidi mamidi*, Tel.; [Cameron gives the Kanarese name as *Turuka gêru mara*.]

This will enable planters to identify the exact tree to which Mr. Gudgeon makes reference.

Scientific Officer's Papers.**XXIX.—PINK DISEASE OF PARÁ RUBBER AND BORDEAUX MIXTURE.**

In my report on my tour in Travancore it was mentioned that at Palapilly Estate, the Pará Rubber trees were being treated with Bordeaux mixture as a preventative to Pink Disease. Mr. R. T. Gudgeon, the Manager, has kindly sent me some valuable information about the process. He writes as follows:—

"Painting rubber trees with Bordeaux mixture to prevent the attack of *Corticium javanicum*.—I will answer your questions in order.

"1st. Strength of Bordeaux mixture.

6 lbs. of Copper Sulphate.

+ lbs. of freshly slaked burned lime in 45 gallons of water.

"This is what I started with, but allowing for a certain amount of Copper Sulphate not dissolving I now put 10 lbs. instead of 6 lbs. I mix it up in lots quarter the bulk of above.

"The Copper Sulphate is dissolved in boiling water and of course in wood or enamel buckets. As a rule the whole of the water to be used is utilised first for dissolving the Copper Sulphate.

"I put a solution as strong as I could make it on 2 or 3 four year old trees, but I found it in no way affected the bark other than slightly drying it up on the outside but nothing like so bad as tar does.

"2. The best mixture I have found and by far the cheapest, as it only cost just the cooly hire for collecting, is the bark from a tree which is locally called *Kola-Mavoo*. This put in water and kept in soaking 5 or 6 days makes an excellent paste. I had 3½ inches of rain a few hours after I had applied the Bordeaux mixture with this paste mixed with it, but one could see the mixture on the trees quite plainly after.

"3. I only paint just where the branches join the main stem and over any wounds there may be on the tree.

4. "I have never tried the sprayer and should imagine it a very expensive way of doing it on large 3, 4, or 5 year old trees, as well as not so effective as the brush. There is no other waste with the brush.

5. "It has cost me about 150 rupees to do 500 acres; 200 acres of which were 2½ year old trees and cost very little. This includes labour, pan, Copper Sulphate and brushes. The amount a cooly will do is difficult to say, as it entirely depends on the age and size of the trees, and I also pruned the trees carefully as I went along, which is not included in the above cost. At least 90% of the trees were done in the older clearings, only those that had branches shooting out very high up were missed. I used about 45 lbs. of Copper Sulphate, but there was a great deal of waste owing to my unfortunately not getting it closely ground and fine quality. Coolies had to grind it themselves the best way they could. Strawson's Copper Sulphate is much the best and dissolves fairly easily in cold water, but I doubt if you get it out here."

The formula used for making Bordeaux mixture here quoted is not the usual one. The latest information I have been able to obtain on the subject of Bordeaux mixture is in the *Journal of the Board of Agriculture (England)* Vol. XVI. No. 10, from which the following extract is taken:—

"Bordeaux mixture for spraying fruit-trees generally (excluding peaches) should be made according to the following formula and in the following manner:—

Copper Sulphate ("blue-stone")	4 lb.
Quicklime (in lumps)	4 lb.
Water	50 gallons.

"Dissolve the 4 lb. of copper sulphate in a wooden tub or bucket—*iron or tin vessels must not be used*. The easiest way to do this is to suspend the material, wrapped in a piece of coarse sacking, in a few gallons of cold water, from a stick placed across the top of a tub, or wooden bucket. If this be done over night, the copper sulphate will be found to be dissolved in the water by the morning. (If hot water be used, the copper sulphate can be placed at the bottom of the tub or bucket, and be dissolved in a few minutes.) Then add water to make twenty-five gallons. Now take the four pounds of quicklime, and put it in a tin pail. Add a few pints of water until all the lime is slaked, taking care to add only a little water at first; in this way a thick creamy paste is obtained. Add water to make twenty-five gallons. We have now twenty-five gallons of copper sulphate solution, and twenty-five gallons of "milk-of-lime." When the two substances are thus diluted with water, they can be mixed together by pouring one into the other, or a bucketful of each can be poured simultaneously or alternately into a third tub, a wooden bucket being used for the copper sulphate solution. The "milk-of-lime" must be well strained, and it is advisable also to strain the Bordeaux mixture before spraying. In this way we obtain fifty gallons of Bordeaux mixture of the best quality.

"Two points are of primary importance in making Bordeaux mixture. The first is that *quicklime*, in lumps, that is to say, as freshly burnt as possible, should be used. Powdered *air-slaked* lime, such as is often found in builders' yards, will not make Bordeaux mixture. The second point to observe is that the two constituents, *viz.*, copper sulphate and lime, are diluted with water as much as possible (consistent with the formula) *before being mixed together*. If concentrated solution of copper sulphate and lime are mixed together, and water then added to make up the fifty gallons, the resulting Bordeaux mixture will be of very inferior quality.

"Bordeaux mixture is fully efficacious only when freshly made, and will not keep. If more than a day old, it requires to be very thoroughly and constantly stirred while being used, and the use of *only freshly-made* Bordeaux mixture is far more economical in the long run, and is here strongly recommended.

"If a considerable quantity of Bordeaux mixture is required for use, the making of *stock solutions* of copper sulphate and lime, which can be kept through the spraying season and used when wanted, saves both time and labour, and is free from all objection. The stock solutions are made as follows:—Take two 50-gallon barrels. In one dissolve 50 lb. of copper sulphate in exactly 50-gallons of water. In the other slake 50 lb. of lime by the gradual addition of a little water; to the creamy paste thus obtained add water to make exactly 50-gallons of 'milk-of-lime.' These stock solutions will keep for months. Before the 'milk-of-lime' is used, the contents of the barrel must be thoroughly stirred, as the slaked lime will have sunk to the bottom. (Care must be taken to stir the 'milk-of-lime' *very thoroughly each time before measuring it out*, so as to get the slaked lime thoroughly in suspension. If this is done there is no difficulty in obtaining the correct quantity of lime per gallon of fluid.) Each gallon which is taken out from the 'stock solutions' will be equivalent, respectively, to 1 lb. of copper sulphate or 1 lb. of lime. The required amount of each stock solution is then diluted with water, according to the formula given above, before being mixed together. The 'stock' copper sulphate solution must be measured out in a wooden pail.

"If it be desired to economise space the 'stock solutions' of copper sulphate may be kept at the strength of 2 lb. of copper sulphate to each gallon

of water, that is to say, 100 lb. of copper sulphate may be dissolved in 50 gallons of water. It is not well, however, to increase the strength of the 'stock-solution' of lime, since the slaked lime in 'milk-of-lime' made at the rate of 2 lb. of quicklime to one gallon of water settles so quickly that it cannot be measured out accurately.

"The barrels containing the 'stock solutions' must be kept under cover, i.e., protected from sun and rain. If stood in a shed, and covered with fairly close-fitting lids made by nailing sacking round the edges of a wooden lid—such 'stock solutions' keep perfectly satisfactorily throughout the spraying season. Two 50-gallon barrels hold sufficient for the making of 625-gallons of Bordeaux mixture; while if the 'stock solution' of copper sulphate be increased in strength to 100 lb. in 50-gallons of water, and another 50-gallons barrel of 'stock solution' of 'milk-of-lime' is added, these three barrels will supply enough to make 1,250 gallons of Bordeaux mixture. By storing such 'stock solutions,' made just before the summer spraying season commences, the grower has the means of obtaining in a few minutes at any time a large supply of Bordeaux mixture of the best quality."

"If the lime used is freshly burnt (and it must never be forgotten that air-slaked lime is useless for making Bordeaux mixture) and carefully weighed out there is no need to test the mixture before using it. When using 'stock solutions,' it is a good plan to apply a test at the first mixing. A rough test consists in immersing a clean iron wire of French nail in the Bordeaux mixture for one minute; if safe to use, the mixture does not affect the nail; while if unsafe, a copper-plated appearance is given to it. A more delicate and quite simple test is as follows:—Procure from a chemist a 10 per cent. solution of ferrocyanide of potassium (which is a poison) and pour a little of this into a white saucer; then drop a few drops of the Bordeaux mixture into the ferrocyanide of potassium. No change of colour occurs if the mixture is safe to use, while a cloudy reddish-brown discolouration (very easy to see) occurs immediately if the mixture is unsafe to use. An unsafe mixture can be made safe by adding more 'milk-of-lime' until it passes the test."

It is important to remember that, as pointed out in the extract above, Bordeaux mixture will not keep, and only the quantity which can be applied to the trees should be made up each day.

With regard to Copper Sulphate enquiries have elicited the following information. Messrs. Peirce, Leslie & Co., Ltd., write that they stock it in Cochin and that they could arrange to do so in Calicut if there is likely to be a demand. They guarantee it 98 to 99% pure, and it is probably in the form of a powder. They consider the best package to be a kerosene oil tin, and the price quoted is Rs.30 per cwt., a price which they could probably reduce for large quantities or for a regular supply.

Messrs. Parry & Co. write that they can supply Copper Sulphate packed in 1 cwt. kegs at the following rates free on rails, Madras:—Lumps Rs.33-8-0 per cwt.; crushed Rs.35-8-0 per cwt. The salt is guaranteed of the highest commercial purity.

The actual benefits to be obtained from this system can only be ascertained after the monsoon is over, and I shall hope to publish the results with the kind permission of the managers of Palapilly Estate as soon as they have been obtained. I have little doubt, however, but that they will prove to be of an encouraging nature.

.. , RUDOLPH D. ANSTEAD,
Planting Expert.

Notes and Comments by the Scientific Officer.

37. *Tephrosia purpurea*.—In the "Planters' Chronicle" for February 5th on p. 29 an extract from *L'Agronomie Tropicale* dealing with *Tephrosia purpurea* as a green dressing was published.

This plant is very common in Mysore, and it will be found covering the open waste lands between Hassan and Arsikere. In the article referred to above it is stated that in the Federated Malay States this plant reaches a height of 9-11 feet. Under local conditions in Mysore it seldom grows more than 3 feet and is usually nearer 2 feet high. This makes it a still more suitable leguminous "weed" to cultivate on coffee estates.

Mysore planters have at their very doors a most suitable indigenous leguminous plant, which will be easy to grow, and seed of which can be obtained in large quantities, and full advantage should be taken of it.

No better method of establishing a mulch and supplying the soil with humus and nitrogen at a small cost can be devised than growing a leguminous green dressing such as this *Tephrosia purpurea*, and all open spaces, and young clearings, should be planted up with this, or a similar plant.

For Rubber also this appears to be a useful green dressing, and this information as to where seed is obtainable will prove useful to Rubber planters.

38. *Soda as Plant Food*.—Sodium is closely related chemically to Potassium and it is nearly always found in the ash of plants. Some cultivated plants, such as Lettuce, Spinach, and Sugar Beets contain considerable quantities of sodium salts in their composition, and apparently are benefited by fertilisers containing Sodium salts, but Sodium cannot be considered as an indispensable constituent of the food of the majority of plants, and it cannot replace Potassium in plant foods. Sodium salts, on the other hand, appear to be a necessary constituent of the food of animals.

39. *Control of Scale Insects*.—The difficulty of controlling Scale Insect attack is largely added to by the fact that the trees and shrubs in jungle harbour them and act as host plants, and constantly communicate them to the cultivated crops. The jungle is constantly producing a supply of injurious insects which escape into the neighbouring cultivated areas.

Constant vigilance alone will meet this danger, which may certainly be reckoned amongst one of the important features inimical to the successful control of Scale Insects.

40. *Importance of Healthy Plants*.—To secure them from disease, plants should be maintained at the highest possible pitch of vigour. A plant which is heavily cropped at the expense of its vigour is the first to fall a victim to disease, and this is especially the case with a permanent crop like Coffee. In combating an attack of disease, or in adopting preventative measure, to keep the plants vegetatively vigorous is half the battle.

RUDOLPH D. ANSTEAD,

Planting Expert.

Marked headway has been made in coffee production in the East Africa Protectorate, but it is pointed out that the crop is so uncertain that planters should not occupy themselves solely with it. An interesting wild coffee has been found in the Nandi forest, where it is estimated that about 8,000,000 wild coffee shrubs exist. Samples of this coffee are under examination at the Imperial Institute.

F. M. S. PLANTERS' IN CONFERENCE.

Rubber.

Mr. Gallagher, Director of Agriculture, was voted to the chair at the planters' conference in the Masonic Hall on May 1st, which was attended by about 40 persons, including several of the leading planters in the Federated Malay States.

TAPPABLE GIRTH.

The Chairman said that most of the written replies he had received favoured a girth of 18 inches, at three feet from the ground, as the best time to begin tapping.

Mr. Baxendale said that, from his own experience, 18 inches was a fair girth to start at. If 65 per cent. of the trees in an area were tappable at 18 inches, it would probably be worth tapping them; but it would depend on the age of the trees. He did not think that tapping increased the growth of trees, on the contrary he thought that the growth of the tree was retarded while tapping was in progress.

Mr. Duncan thought the girth at which tapping could be begun should be determined more by the possibility of tapping well than by any particular size. Personally he should not like to start tapping trees of small girth, but, having 80 per cent. of trees of that girth, he would not mind tapping down to 16 inches. He did not think the quality of rubber from young and old trees differed very much. If a tree was big enough to be tapped without any danger it should be tapped.

The Chairman said the general opinion seemed to be that age should not be considered, but girth alone, and 18 inches at a height of three feet from the ground was generally favoured.

Mr. E. V. Carey asked if anybody could say whether small trees were injured by tapping.

The Chairman said only two answers had been received under this head: one said it increased growth, the other that no harm resulted if the methods were good.

Mr. M. Cumming said that he had known trees badly tapped which had had their growth retarded for several years.

The Chairman said he thought the meeting was in favour of tapping at 18 inches girth three feet from the ground, and that it agreed that, if a tree were tapped well, there was no deleterious effect.

TAPPING SYSTEMS.

The next point discussed was the best system of tapping. In the written answers sent in, the Chairman said, five correspondents preferred tapping two opposite quarters, one suggested one quarter in one year and another said, for convenience of working, he preferred two adjacent quarters, though, apart from convenience, he would prefer two opposite quarters.

Mr. F. G. Harvey thought that opposite quarters was the best system, but the objection was that two cups were required.

Mr. H. W. Trotter said the only plan he knew was to take one line up and come down the next line and use one cup in the morning and the same cup in the evening on the other side.

Mr. Cumming said there was one point on which people were pretty well satisfied, and that was that, on tapping renewed bark, the bark was got through more quickly than the first time.

The Chairman said that he should have some figures available in the near future on influence of distance between the cuts, as he thought the question was an important one. He then traced a diagram on the blackboard to show that the further apart the cuts were made the less distance the material to renew the cut away bark had to move in a transverse direction—its course more nearly approached a line parallel to the axis of the tree. Turning to the question of which period of the day was best for tapping, the Chairman said the answers he had received varied from 5 to 10 a.m. and 6-30 to 9-30 a.m. After some remarks from those present, he said that it was, like other questions, a subject of compromise. Planters might know what was the ideal, but they had to fit it in with special circumstances in which they found themselves.

On the question of whether it was best to tap every day or every other day, Mr. A. J. Campbell, Superintendent of Experimental Plantations, said that, as the result of experiments which he had carried out over a period of six months, he found that, in the first three months, tapping on alternate days gave slightly the best results, but during the second three months, tapping every day gave the bigger yield.

Mr. Cumming said he experimented with daily tapping for six months, and had to return to tapping every other day.

Mr. A. J. Fox, on the other hand, said he went back to daily tapping after trying alternate days.

Mr. C. Burn-Murdoch said he found daily tapping yielded very little more latex than tapping on alternate days.

Mr. A. B. Lake thought the result of the experiments would depend on the character of the land.

Some discussion ensued as to the amount of labour required by the two systems, in the course of which the Chairman said that the number of cuts—the amount of bark removed—at the end of two days was the same under both systems, but the cooly walked twice the distance and used twice as many cups in every day tapping as in tapping on alternate days. In conclusion he said that he thought a majority favoured tapping on alternate days, but he reminded his audience that there were two ways of looking at this as at other problems; the best way, and the most practicable way under the particular conditions to be faced.

VARIATIONS IN YIELD.

In opening the discussion on "Variation in Yield" the Chairman drew on the blackboard a sketch of a chart showing the monthly variations in yield.

Mr. Baxendale then said:—Before venturing to address an audience which includes so many planters who have had the advantage of a more varied experience than my own, I would like to make it clear that, with one exception, my remarks only apply to a very limited area in one of the Coast districts. The conditions, soil, rainfall etc., are so different in the hill country and the lowlands, that I shall be filled with a glad surprise if my experiences have been generally shared by those whose interests are confined to an Ulu district. I must at any rate go to the hill country for the highest yield I have ever known. This was from one of the trees imported by the late Sir Hugh Low, and it is growing on Gapis Estate Perak. In fifteen days, from July 17th to July 31st, 1902, I collected 6½ lbs. of rubber from three small cuts close to the base. After I left Gapis, Mr. Salisbury continued the tapping spasmodically, and the total result of our labour, in 35 days actual tapping (between July 17th and September 18th, was 18 lbs. of rubber dried in

lumps. The tree was 25 years old and measured 89 inches in girth, at one yard from the ground. At the risk of depreciating shares in Coast district estates I must regretfully turn to my own country-side and submit nine pounds an acre a month as the average for the first three months' tapping of four-year-old trees, as the lowest yield I have experienced. While it may be asserted that a large and well-distributed rainfall is essential, the benefit is not always immediately apparent. For instance, I found the yield per coolie in the wettest month last year considerably below the average. The fact that the tasks were completed later in the day no doubt had a good deal to do with this, but when the trees become very wet the latex washes over the cuts and spreads itself in such a fine layer down the bark that it is most difficult to collect even in scrap form.

"I do not find that this has any adverse effect on the yield. Both this year and last year our highest yields, not only by the coolie but by acre as well, were in February and March when the wintering was general.

"A certain botanical authority, who from time to time writes to financial papers advising that no more than 40 trees should be planted to the acre, evidently fails to take into consideration the damage done to such brittle trees, by wind, white ants and fungus.

"The fewer trees, the greater the percentage of loss; but even if all survive, I question if you would be getting the best results from your land by such wide planting. Basing my results from avenue trees (8 lbs. each at 8 years old), I find that if the trees in the old fields had been planted 40' x 40' instead of 15' x 15', we should be harvesting considerably less rubber than we do at present.

"I know that 15' x 15' is now generally considered too close; but, at any rate, it allows of a good selection being made when thinning out becomes necessary. The best result I can quote from any field in the Coast districts came from one originally planted with 312 trees to the acre, and gradually reduced to 140—at ten years old.

"While I believe in the advantage of regular and systematic tapping, I have on more than one occasion seen striking evidence that the Pará tree accumulates reserves of latex. Of course, I am aware that many people hold the same theory on this subject that others hold about women, dogs and walnut trees—'The more you beat (or tap)'em the better they be,' and anything I may say which savours to the contrary may be regarded almost as heresy by some present. I do not mean to say that, if the 25 years old tree I tapped for the first time in 1912 had been tapped twenty years earlier, it would not have yielded far more rubber in the course of its natural life—and I am also prepared to allow that it would have been more profitable to its owners, unless its output had flooded the market for pencil erasers, which was its most important purpose in those days—but I think I am justified in entertaining doubts of the yield being maintained at the rate of half a pound a day, until some one tells me he has collected 180 lbs. of rubber from any tree in a year.

"It is the same story with young trees. I never now see the brimming cups of latex that used to gladden my heart in bygone days when we tapped our trees vigorously for three months of the year and rested them for nine. But now, though the tree yields less per day, it yields more in the year and it pays to tap every day (or alternate day) if the price of rubber was even less than 12s. a lb.

"There is, however, this to be said for 'resting.' If your estate happened to be—unlike any of those floated in the last few years—short of labour—

you would have the consolation of knowing that you could get back some of the arrears and at less cost of collection—provided the shortage was not great enough to make the 'rest' too long."

Mr. Trotter and Mr. Lake both said they found that the response of rubber to rain was felt the second day following that on which the rain fell.

Mr. P. W. Parkinson said his experience was that the yield was higher in wet than in dry weather.

Mr. Duncan said that trees responded very quickly to rain in flat land.

Mr. E. V. Carey said that, on the whole, he found the yield better in wet than in dry weather.

Mr. Trotter then described the case of two neighbouring estates, one of which, in March, 1909, was yielding at a much higher rate from young trees than the other from old trees, while in March of this year the opposite was the case; the estate whose trees were yielding so much in 1909 was not doing as well, while the estate with the older trees was yielding excellently.

Mr. Dupuis Brown thought seeding affected the yield. The decrease in the published figures of February outputs from estates this year was very marked.

It was pointed out by some of those present that February was a short month, that it included a Tamil holiday, and that these two factors necessarily made for a decreased output.

Mr. R. W. Harrison thought that hill ground maintained yield better in drought than rubber planted in flat land.

BARK RENEWAL.

On the question of bark renewal, the next item on the agenda, Mr. Cumming said that regarding distance of planting, which was a factor, a great deal depended on the configuration of the land. Closer planting was possible on hill land than on flat because the light had more chance to get among trees on the slopes of hills than on level ground. He thought that, from his observations, close planting would, during the first few years, give more rubber than wide planting.

Mr. Parkinson said he considered two years was an ample allowance for bark renewal on the first tapping, but, afterwards three years was required.

The Chairman said a similar view had been sent in by one planter.

Mr. Cumming said there were a great many estates the trees on which might be tapped after six months for bark, renewal. As the chairman had said, it all depended on the depth of the cut.

The Chairman said that the general opinion seemed to be that three years was the right time to allow for bark renewal though it was his impression that most estates were worked on a four year system. It was not a question only of what a tree would bear, it had to be considered what thickness was best to give an economic return.

NUMBER OF CUTS.

On the question of the number of cuts to the inch, the Chairman said he had received written answers giving 10, 16 to 20, 22, and 25 cuts.

Mr. Lake said he favoured 25, and Mr. H. T. Fraser thought 30 was a possible number.

The Chairman considered that 20 cuts per inch ought to be obtained, that 22 was a good average. He thought anything over 25 would be exceptional.

Mr. Cumming said a lot depended on how old the trees were when tapping was started. In tapping ten-year-old trees never tapped before it was not possible to get more than 10 to 12 cuts to the inch.

Mr. Parkinson agreed, and added that it was not possible to get so many cuts on renewed bark as on trees newly tapped.

The Chairman said it seemed that a good average was 23 to 25 cuts. His experience was that it was possible to get more latex with 20 or 22 cuts than with 10 or 15. Some Ceylon planters, with whom he had lately spoken, had assured him that in Ceylon it was no use trying to get more than 15.

Turning to the next item, the best kind of knives, cups and instruments generally, the Chairman said the written answers favoured the improved farriers' and the gouge except one, the writer of which preferred the Sculfer knife.

Mr. Parkinson said more depended on "The Man Behind the Knife" than on the knife itself.

On the subject of latex cups the Chairman said he had had answers from eight people: five were in favour of glass, and three of earthenware, while three of the answers added that no metal cups should be used.

Mr. Cumming said he had experimented with aluminium cups. They were expensive, but at the end of six months they were just as good as ever. They were also easily cleaned and light to handle.

Mr. Parkinson had found porcelain satisfactory. It cost a good deal more than tin, but it was clean and had a longer life. His coolies took round a latex bucket, washed the cup on the spot and hung it up. Latex came well out of a porcelain cup.

Mr. Duncan said he employed the same method. He had found glass cups very satisfactory as they were easy to clean. A good many, however, arrived broken.

Mr. Parkinson said the percentage of porcelain cups broken in transit was very small.

The Chairman said he thought there was a general agreement that tin cups were not so good as cups made of aluminium, glazed earthenware or porcelain. He added that he supposed most people were agreed that all other vessels should be of the best quality of enamelled iron, as cheap qualities chipped too soon.

In the course of some remarks on spouts, it was mentioned that aluminium v-shaped spouts had been used.

COLLECTION OF LATEX.

Discussing the collection of latex, Mr. Duncan said he had the latex put straight into enamelled tins, acetic acid was added, and the tins were then placed on trunks and taken straight to the factory, the shaking in transit assisting coagulation.

The Chairman said that the main question was whether it was best to coagulate the latex in the field or at the factory.

Mr. Cumming said that, when latex had to be brought a long way to be coagulated, it was not so good as if it was coagulated on the spot.

After some further discussion the Chairman said it seemed that there was an agreement that the quicker latex could be coagulated the better. It seemed to him that the meeting favoured coagulating in the field.

Mr. Fox then said that he had been running a smoking machine for the last ten days as an experiment. At first it had turned out rubber of a

variety of colours, but latterly the colour had been more even and the process seemed, so far, to be a good one.

The Chairman thought smoking was the system of the future, and added that it would be interesting to see what price the rubber produced by Mr. Fox's machine fetched.

THE COOLY'S TASK.

The next subject discussed was the cooly's task.

The Chairman said it was difficult to fix the task. His written answers gave from 800 to 1,500 cuts per day and 250, 275, 300 and 310 trees.

Mr. Fox said he found his coolies averaged 1,600 cuts. The cooly tapped and collected the rubber, but did not "scrap."

Mr. Parkinson said the task must vary with the age of the tree. He found an average of 150 trees with 8 cuts each making a total of 1,200 cuts, the cooly collecting the latex and bark, washing the cups and carrying the latex to the coagulating sheds. With older trees he found an average of 120 trees with 8 cuts each. The "scrapping" was done by women and children. When doing 150 trees the cooly did 75 in the morning, stopped, collected the latex; then another 75, finishing from 2 to 2-30 p.m.

In the course of some further discussion the Chairman said on one estate the tapper did nothing but actually cut the trees. He did not even place the cups.

Mr. Duncan said the difficulty of such a system would be that another coolie would always have to be ready to place the cup at exactly the right moment.

CONTROL OF TAPPERS.

On the question of the control of tapping coolies, which figured next on the agenda, Mr. Burn Murdoch said:—"I feel very diffident about opening the discussion on this question, as I have seen few estates beyond my own circle and have no information of their methods of control. The question asked is—is the control of the individual or the group the best, and how? I say unhesitatingly 'of the group.' The whole matter in my mind is very closely identified with heading No. 11 on the agenda, 'Style of book for keeping returns,' for this reason, that the daily return, if kept for separate sections, enables a very close supervision to be kept on any particular group or section. For instance, if Section I, under normal conditions, gives 100 lbs. and a look at the list shows it has fallen off to 70 lbs., that particular section can be at once visited and the reason of this falling off almost certainly found out. This would apply also if the same area could be otherwise efficiently controlled. The size of the sections, of course, depends on the lay of the land, but I would not recommend sections of more than about 6,000 trees. A good-coolie or sub-kangany can be put in charge of this. I do not think there can be anything said in favour of individual control. It is impossible that there can be Europeans enough to watch all the individuals. The European, of course, generally supervises the work and gets at the individual through his section kangany. I do not think I need say any more in opening the discussion under this heading."

Mr. Parkinson said he agreed that the system was best on a large estate. On his estate they worked by fields of 20 acres or more. If there was a falling off on any particular field it was possible to find out by the returns sent in to the office, and go and visit it.

In answer to a question asked by the Chairman, Mr. Burn Murdoch said about 30 men could be conveniently controlled in a group under his system.

PERCENTAGE OF GRADES.

The last subject which was brought before the meeting was the percentage of different grades.

Mr. Burn Murdoch gave 75 per cent. of No. 1 as the results of his observations. Mr. Baxendale thought 60 per cent represented the average of the low-country in a dry season.

In the further course of the discussion Mr. H. T. Fraser read the following figures relating to a series of experiments lasting over a period of six months :—

YOUNG RUBBER.				
		First three months.		After six months.
No. 1	...	85	...	83
Lump	...	1	...	3
Scrap	...	10	...	10
Shavings	...	4	...	4
		100%		100%

In concluding, the Chairman remarked that he thought 70 was a good number, and he added the caution that, in order to ensure purity, the water in the cup should be as clean as possible, as all the little hardly visible impurities in the water were centres of coagulation in the cup. Finally, he said that he was sorry to say that the books he had hoped to have showing the style of book useful for preparing rubber returns were not ready, nor were the plans of a drying house yet available.

An enthusiastic vote of thanks to Mr. Gallagher for taking the chair with such conspicuous success brought the meeting to a close.

Production of Cinchona Bark.—At the present time the production of cinchona bark is almost confined to Java, the exports from Ceylon, India, S. America, San Thome and elsewhere, though of some importance, being almost negligible in comparison with the quantities shipped from the Dutch East Indian Island.

In spite of this practical monopoly of the cinchona industry there has been much dissatisfaction among planters in Java for many years on account of the low prices obtainable for bark, and various attempts have been made to restrict the output of bark and thereby force prices to a higher level. An agitation of this kind is at present proceeding in Java, which has for its object the reduction of the output by 25 per cent. and the raising of the price of bark to a minimum of six cents per kilo. for each unit per cent. of quinine sulphate obtainable from it. It is stated that the proposed restriction in output is likely to find support not only among planters in Java but also among merchants dealing in cinchona bark in Europe, and possibly also among manufacturers of cinchona alkaloids in Europe, and United States. On the other hand, competent authorities are of opinion that the interests involved are too numerous and too much opposed in objective to permit of the restriction of output being carried into effect. The proposal is, however, one of some interest to the owners of cinchona plantations in Ceylon, India, and other British possessions, and also to the Governments of such countries as India, Italy, Greece, and others which have undertaken the supply of quinine to their inhabitants as a preventive of malaria.—*Bulletin of the Imperial Institute.*

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S. I. Planters' Benevolent Fund.

The Hon'ble Mr. J. G. Hamilton has offered to become a Life Member of the Fund on condition that nineteen other planters subscribe Rs.200 each for the same purpose, on whichever of the terms (laid down in the rules) may be voted for by the majority. He gives his vote for payment of Rs.200 at once.

Mr. C. Courpalais having subscribed Rs.200 already, only eighteen more names are required to complete the necessary score; and Mr. Courpalais may be taken as voting with Mr. Hamilton, for his subscription has been paid.

Cochin Planters' Association.

The newly formed Cochin Planters' Association has applied for affiliation to the U. P. A. S. I., and the votes of Councillors have been asked for. It may be assumed with certainty that the new member will receive a very hearty welcome.

The Scientific Officer.

Mr. R. D. Anstead, B.A., expects to return to head-quarters from the Nilgiris by the 11th proximo. Unfortunately, the illness of Mr. E. F. Barber, Honorary Secretary, Nilgiri Planters' Association, makes it a little doubtful if the meeting of that body fixed for to-day will take place. It is Mr. Anstead's intention to attend the meeting if one is held.

Planters are requested to note that while the Scientific Officer is on tour specimens of insects, &c., addressed to him are not usually forwarded, unless he specially asks for them. In some cases it would be useless to send them on, as they require examination under the microscope. It often happens, too, that even the receipt of small specimens would inconvenience Mr. Anstead, as, for instance, when he is making only a short stay at each of a number of places in the course of a rapid tour.

Any small specimens of a really urgent character that senders wish forwarded at once to the Scientific Officer and that are capable of being reported upon without the help of a microscope or other scientific apparatus, should be clearly marked: "To be forwarded."

"Tephrosia Purpurea."

Since Scientific Officer's Paper XXVIII was written Mr. Anstead has discovered that this plant (*vide* "P. C." V, No. 17, p. 199) is very common on the Shevaroyes, and grows all over the waste land on the hills.

Scientific Officer's Papers.**XXX.—SCALE INSECTS AFFECTING COFFEE ESTATES.**

At the Annual Meeting of the North Mysore Planters' Association held on March 11th 1910, the following resolution was passed:—“That in view of the havoc being wrought on the Pulney, Nilgiri, and Shevaroy Hills by the attacking of Coffee by the Scale pest *Lecanium viride*, the Scientific Officer be requested by the N. M. P. A. to kindly issue, and circulate through the *Planters' Chronicle*, an article couched in the simplest wording, fully descriptive of the said bug and its appearance upon shade and coffee, which will enable the practical planter to at once identify it on its first arrival in our district, and distinguish between it and the lesser pests *Lecanium imbricans* and *Pulvinaria psidii*, which most of us have with us and do not much fear on account of their confining their attacks to shade trees: with a view to immediate and effective action being taken for extermination at the outset, while only it appears possible.”

The following article is an attempt to comply with this resolution. It is not claimed that there is anything original in the article; in fact, it has been compiled from various sources, and is merely an attempt to summarise in a popular way an account of Scale Insects which are to be found on Coffee and its shade, with the methods to be adopted for their control.

This, I take it, is what is desired by the members of the N. M. P. A., and I trust that it may be found useful by them.

LIFE HISTORY.

Scale Insects and Mealy Bugs belong to the order of Insects known as *Hemiptera* (half-wings) or true Bugs. Their life histories vary a great deal, but the following description given by Mr. H. M. Lefroy, the Imperial Entomologist, in Bulletin No. 2 of the Department of Agriculture in India dealing with “Insect Pests of Coffee in South India,” applies with small modifications to all the species dealt with below:—

“Scale Insects are, as a rule, hatched from minute oval eggs, of various colours; in few cases only are the young produced alive, no eggs being deposited. On hatching, they appear as minute insects, oval in outline, the body flattened and indistinctly marked off from the head. The head is provided with a pair of minute eyes and with a delicate sucking apparatus, consisting chiefly of long fine threads. For some time after emerging from the egg, they walk actively with three pairs of legs and seek for a suitable spot on their food-plant in which to insert their suctorial threads. Having done this, and thus fixed themselves to the plant, they grow larger, and the first skin is cast off to allow of further growth. From this time the life-history differs for each sex. The females continue to grow, and, after casting a second skin, soon arrive at maturity. The males pass through a distinct transformation, similar to that of butterflies and other insects. The first skin being shed, growth continues and a second moult takes place. This brings the insect to the pupal stage, during which no food is taken, and internal changes go on, resulting in the formation of the perfect insect, which emerges from the skin of the pupa. The adult insects differ very much in appearance. The females are unlike most insects, being frequently legless, their bodies indistinctly segmented, usually very much flattened. The sucking apparatus remains unchanged, but there is little else to mark them as insects. Their bodies become filled with eggs and shrivel up as these are laid, until the insect dies. The males are minute fragile insects, with a well-defined head bearing large eyes, with one pair of wings and three pairs of legs. The head, thorax and abdomen are clearly marked off, and their general appearance is more similar to that of other

winged insects. Their extreme minuteness and delicacy, combined with their short life, render them especially difficult of observation. Scale insects are minute, the size of the females varying from that of a pin's head to that of a pea; in exceptional cases they become larger when mature."

The damage done to the plants attacked by these insects is due to loss of sap. They are usually present in very large numbers, and the loss of sap due to the sucking of this army of scales is so large that the plant is killed or very much weakened. This is especially the case when young shoots and foliage are attacked.

BLACK BLIGHT.

Scale insects excrete a sweet sticky fluid which covers the leaves and stems of the plants attacked, and in the case of a bad attack may drop upon the plants growing beneath. In this fluid a black fungus, or mould, often grows, obtaining the food for its growth from the fluid. This gives the sooty appearance which is popularly known as "*Black Blight*."

It must be clearly understood that this "*black blight*" and the scales are quite distinct things; the former is a fungus and a plant, and the latter an insect and an animal. If the scales are removed, the fluid excreted by them is removed also, and the fungus dies for lack of food.

The fungus is purely superficial, and does not actually grow into the tissues of the leaf. It does a certain amount of damage by choking up the stomata, or breathing pores of the leaf, and by covering it up with a layer through which light cannot penetrate; but the harm done is small compared with that caused by the scales, which are the real cause of the death or weakening of the plants attacked.

SPECIES OF SCALE.

The following are the Scales usually found attacking Coffee and its Shade Trees in Southern India.

Lecanium viride (Green Bug.)

This is the well known "Pulney Bug" which has done so much damage on many Coffee Estates. It is an elongated, flat, deep green scale, and is easily distinguishable from all other scales here dealt with. It never develops wax at any stage of its existence. When examined under a magnifying glass it is seen to have on its back a black, wavy line forming a horse-shoe-shaped outline. These two features serve to distinguish it from *Pulvinaria psidii*, the Green Mealy Scale, with which it can alone be confused. An oblong, green scale with this wavy horse shoe-shaped line on its back is *Green Bug*; a green scale without this mark, which develops white wax as it grows older, is Green Mealy Scale.

It is usually accompanied by Black Blight. The eggs are laid under the body, which then shrivels up, leaving them under the shelter of the fixed scale. These eggs hatch out into small active insects, which move about till they find a suitable place to settle down and feed.

It is found on a very large number of plants, including trees and weeds.
Remedies.—(See "*P. C.*" Vol. IV., p. 210.)

These may be summarised thus :—

- (a) Destroy as far as possible all trees and weeds known to be subject to attack by this bug.
- (b) Prune back the infected coffee and burn all the prunings, and then spray, or brush, with an insecticide.
- (c) Cultivate highly and manure to keep the vigour of the trees at a high pitch.

Lecanium hemisphaericum (Brown Bug.)

This scale is sometimes called Black Bug. It is a shield scale, and never develops wax. The full grown scale is a deep brown colour, and hemispherical in shape. The life history is similar to that of *Lecanium viride*, and it is often accompanied by Black Blight.

The Brown Bug attacks Coffee and is usually found at the extremities of the shoots, especially of young plants. It attacks several other plants besides Coffee, including Tea, Guava and Loquat, and it is a widely distributed scale.

Remedies.—As soon as the attack is noticed the coffee should be sprayed, or brushed, with an insecticide.

Lecanium imbricans (Red Cedar Scale.)

This is also occasionally called Black Bug. It is a very large, blackish scale, much larger than any of the other scales here dealt with, being sometimes the size of a four anna piece. It is in shape like a tortoise-shell, and when there are large numbers of the insect they overlap one another at the edges like rows of tiles. It usually occurs on *Red Cedar* or *Gungurri* (*Cedrela toona*) but has also been found on other trees such as the *Goni* (*Ficus mysorensis*).

The scales produce a large number of eggs under their bodies of a delicate pink colour. It often occurs in such large numbers that it kills the trees attacked, and moreover it is always accompanied by a thick covering of Black Blight which covers the Coffee trees beneath to such an extent that they may be killed.

Remedies.—The only remedy is to cut down all trees or branches attacked by this scale and burn them.

Lecanium formicarii (Silver Oak Scale.)

This is found on the leaves and young shoots of *Silver Oak* (*Grevillea robusta*). It is a small brown scale which is often attended by ants which build shelters over it. It does little damage as a rule and can be treated by spraying.

(To be continued.)

RUDOLPH D. ANSTEAD,

Planting Expert.

Instructions are given in the Government Gazette of Southern Nigeria regarding fungoid disease of Pará rubber plants. A fungoid disease and also a scale insect have been observed attacking leaf stalks and young shoots of Pará rubber in the Mamu reserve plantations. It is recommended that infected leaves and shoots should be cut off and burnt, the wounds being treated with coal-tar creosote.

—:O:—

The Governor of Madras in Council has authorised Mr. Charles Howland, of Mayfield Estate, Nellakota, the Nilgiris, to witness the execution of labour contracts.

DISTRICT PLANTERS' ASSOCIATIONS.**South Mysore Planters' Association.**

Extraordinary General Meeting held at the Munzerabad Club, Saklaspur, on Monday, 9th May 1910.

PRESENT :—Mr. J. G. H. Crawford, President, Messrs Graham Anderson, C. I. E., T. Anderson, H. D. Chaldecott, Capt. E. C. Foster, Messrs Park, Sladden and C. K. Pittock, Honorary Secretary.

Visitor.—Mr. V. Hunt.

The President in opening the Meeting explained that the sad news of the death of the King-Emperor had only reached him the day before, but that an immediate meeting had seemed desirable to enable the Association to give expression to their grief and to convey their sincere condolence with the Royal Family at the earliest possible date.

Mr. Graham Anderson spoke as follows :—“ No words, that I can hope to find, can possibly give adequate expression to my feelings, on this truly mournful occasion. The demise of our beloved King-Emperor has come upon us so suddenly and so unexpectedly that we cannot but feel absolutely overwhelmed with unutterable sorrow.

“ By His Most Gracious Majesty's death, the whole civilized world has suffered an irreparable loss, which each individual cannot but regard as a personal bereavement, as His Most Gracious Majesty was universally beloved and esteemed as an ideal monarch, whose every action manifested wisdom, justice and tact combined with a spirit of true friendliness.

“ Far more adequate tributes of honour and praise will be paid to the memory of our illustrious sovereign than I or you can hope to do, but we are assembled here to mourn a sorrow, which, as I said before, we regard as an overwhelming personal bereavement, and if we experience grief in this form, what must be the feelings of Her Most Gracious Majesty the Queen and all members of the Royal Family.

“ That an all Merciful Providence may bless them, and give them strength, comfort and support is our fervent prayer, as in our hearts we feel the truest sympathy for them in a crushing sorrow which overshadows the whole civilized world.”

The following telegrams were despatched from the room :—

To His Excellency the Viceroy of India,
Simla.

The lamented death of His Most Gracious Majesty the King-Emperor has caused the most profound sorrow to the members of the European Community of South Mysore, who, at a meeting held to-day, have directed me to convey to your Excellency a heartfelt expression of their grief and their sincere and humble condolence with Her Most Gracious Majesty Queen Alexandra and all the members of the Royal Family.

To His Highness the Maharaja of Mysore,
Ootacamund.

Your Highnesses European subjects in the Southern Malnad desire to tender a sincere expression of their profound sorrow at the death of His Most Gracious Majesty King Edward Seventh Emperor of India.

The Meeting then closed with the usual formalities.

(Sd.) J. G. H. CRAWFORD,
Chairman.

(Sd.) C. K. PITTOCK,
Hony. Secretary.

THE PLANTERS' ASSOCIATION OF CEYLON.

Extracts from Minutes of Proceedings of a Meeting of the Committee of the Planters' Association of Ceylon, held at Kandy, on Friday, the 13th May, 1910.

REGISTER OF PLANTING BILLETS.

On the motion of Mr. G. C. Bliss, it was resolved:—"That two books be kept by the Secretary at the Planters' Association office for the recording of planting billets, vacant and wanted."

CEYLON ASSOCIATION IN LONDON.

Read letter from Mr. Martin Leake, dated 18th March, intimating that it had been agreed with the Chairman of the Port of London authority that the *maximum* rate for tea, as published, *viz.*, 3s. 4d. per ton, should be reduced in actual practice to 1s. 8d. per ton, or about 1d. per chest, and that the maximum rates on other Ceylon produce would be similarly dealt with.

THE "THIRTY COMMITTEE."

Extracts from minutes of proceedings of a Meeting of the "Thirty Committee" appointed to administer the proceeds of the export duty on tea levied under Ordinance No. 4 of 1894 for increasing the consumption of Ceylon tea in foreign lands, held at Kandy, on Saturday, the 14th May, 1910.

MISCELLANEOUS.

Read following letter from the Trading Company, Colombo, on the subject of bristles in Ceylon tea:—

The Secretary, Planters' Association, Kandy.

Dear Sir.—By the last mail we were requested by our Head Office to draw your attention to the fact that complaints are again being made by the Russian Mahomedan buyers that bristles were being found in the packages of several estate teas.

We shall be obliged if you will please draw the attention of the planters to avoid the use of bristle brooms in their factory and point out to them how objectionable this stuff is to our Mhaomedan buyers, who form a large part of our customers, and unless the planters are careful in avoiding the use of bristle brooms, however good the teas may be, we will be obliged to pass off such estate tea unnoticed. We believe you are aware of the religious principles of the Mahomedan and the objections they have to anything concerned with this stuff.—We are, dear Sir, yours faithfully, The Trading Company, successors to Alexis Goobkin, A. Koonetzoff & Co. p.p. J. A. TITOFF.

Colombo, 28th April, 1910.

Resolved:—"That the Secretary be instructed to point out in reply that animal bristle brooms were not used in Ceylon factories, and that what was complained of really consisted of fragments of coir fibre or jute hessian."

INDIAN AND CEYLON TEA ROOM AT THE IMPERIAL INSTITUTE.

Submitted memorandum forwarded by Sir Stanley Bois from Indian Tea Association, London, regarding a suggestion by Professor Dunstan, that India and Ceylon should join in establishing a tea room in the Imperial Institute.

Resolved:—"That this Committee is in sympathy with the proposal for purely advertising purposes and that details be left in the hands of the Chairman and Secretary."

CORRESPONDENCE.**Deterioration of Coffee.**

Savoid Butty, Polli Betta,

28th April 1910.

Dear Sir,—A great deal is now spoken of, with regard to the deterioration of the Coffee bean in Mysore and Coorg. Many suggestions have, I believe, been made to improve it, but still the color is evidently far from satisfactory, and I would suggest that you be asked, whether you do not consider this want of color due to a lack of the Essential Oil in the bean, and how to reconstitute this failing, and what it is due to.

I was very much struck when comparing samples of coffee beans, Rio and Santos, with the oiliness of the bean, and comparing it with the want of the same in our own. I have noticed this want of that Essential Oil for long, and when speaking of it to a Coorg planter who had a large experience in Curing Works, he informed me, that during the years he had been a Curer, he had been much struck with the same want as I had noticed. During the first years of Curing, he informed me that when the coffee was being peeled the machinery had often to be stopped, and the rake behind the peeler taken off and scraped, because the oil from the coffee had caked so with the coffee husk.

In later years this had not to be done, as there was no oil for the husk to cake on.

This surely must prove the loss entirely of the "Essential Oil" in the bean.

Can you tell me how to get back this oil?

If this could be done, I feel sure that our samples of coffee would not be so spoken against.

The bean now is dry and parched in appearance, which it was not in bygone years.

(Sd.) H. B. FERGUSON.

[*Note by the Scientific Officer.*—Mr. Ferguson's interesting letter suggests an important line of research work in coffee, and the answer to his question could only be given after a detailed laboratory investigation, which might take several years. This sort of work should certainly be undertaken, and I should be only too pleased to undertake it. To do so, however, it is essential that I should have a good laboratory at my command, a necessity which at present I have not got. In the meanwhile I should be glad to hear the opinion and experience of other Coffee planters with regard to this suggested deterioration of the oil content of the Coffee bean, and its consequent fall in market value.—RUDOLPH D. ANSTEAD, *Planting Expert.*]

Insecticides.

Agricultural Research Institute,

Pusa, Bengal,

Camp Coimbatore, dated the 19th May, 1910.

Dear Sir,—Insecticides are being increasingly used in India and I have for several years been trying to render available to the public good insecticides at a reasonable price. Up to now, there have been no firms or private individuals specialising in this, and the insecticides principally used have

been those made locally as required. I have at different times tested patent insecticides which firms in England, America, and Germany proposed to sell in India but these have been practically all either inefficient or too costly. Recently an insecticide made in India, known as Vermisapon, has been put on the market; the producers have consulted me, and I have suggested certain modifications. The insecticide has been thoroughly tested by me on a variety of insects, and I know how it is prepared. It is, I believe, a thoroughly reliable contact poison, effective against the various sucking insects such as bug, mealy bug, scale insects, plant-lice, thrips, etc. which attack tea, coffee, fruit trees, vegetables and garden plants; it will also kill small caterpillars and biting insects, and to some extent deter larger biting insects, but is not a Stomach Poison. It is harmless and non-poisonous, requiring no heat for its mixing with water and prepared by simply dissolving in water. Its price is remarkably low and it is the cheapest insecticide known to me, cheaper at the same effective strength than even Rosin Compound. I write to draw your attention to it, as it is likely to be of value in many cases where spraying is or should be practised and because its production in India removes one of the difficulties which formerly militated against spraying as a remedy for pests on valuable cultivation. I forward particulars showing its cost and where it may be obtained.

(Signed) H. M. LEFROY,

Imperial Entomologist.

The Indian tea industry continues to make steady progress, says the *Grocer* of April 2, 1910, and the season now drawing to a close should prove satisfactory to growers, comparing favourably with any of the more prosperous years recently experienced. In their annual review, Messrs George White & Co. observe that the chief feature in connection with the Indian outturn was that, after showing a shortage for the first half of the season, it proved to be the most prolific on record during the later manufacturing months, thereby changing the deficit into a substantial increase. Despite the larger offerings the market not only held its own, but the lower grades steadily advanced. . . .

The outlook is for continued prosperity to the industry, and provided no untoward incident occurs the optimistic views at present generally held are likely to be justified. It had been thought that with increased production both in India and Ceylon prices would decline, as is usual in the case of abnormal crops, but values have steadily hardened, except that recently medium grades being in excessive supply have been cheaper. Any reduction in value is more apparent than real, as in the case of heavy and rapid flushing, accompanied as it usually is by coarser plucking, the average quality is inferior, and the intrinsic difference between the price of common and medium grades almost disappears. It is to be hoped that growers will maintain the standard of all grades, and although common will be wanted in increased quantities, good useful teas should be sent, and not thin, stalky sorts. The public taste for fine tea is improving, thanks to the efforts which distributors have made to gain business by giving an article of sterling value. Those gardens capable of producing really attractive quality should aim at a high standard, as the tendency in all markets is to draw a sharp line between ordinary and fine tea.

SELECTED CUTTINGS.**Fungicides.**

The Eleventh Report from the Woburn Experimental Fruit Farm is concerned almost entirely with the subject of copper-containing fungicides, their chemical and physical properties, the nature of their fungicidal action, and of the scorching which, under certain circumstances, such fungicides produce on the sprayed parts of plants. The results of these researches appear at a time when growers are paying increased attention to spraying as a preventive against fungus diseases, when—to give but one instance—gardeners, as well as commercial fruit-growers, are learning by experience that clean Apples and Pears, free from all trace of “scab,” can only be obtained in this country if the trees are protected by the proper spray.

Spraying experiments on a practical, commercial scale have shown in Kent and elsewhere in England—just as they have shown in all the fruit-producing countries of the world—that Bordeaux mixture is by far the most efficacious spray yet discovered for “scab” and fungus diseases generally.

Considering the importance of Bordeaux mixture for the fruit-grower, whether amateur or commercial, it will be well to note first the information which the Eleventh Report gives on this subject.

Although the value of Bordeaux mixture was demonstrated by Millardet so long ago as 1882, it was not till 1907 that, thanks to Mr. Pickering's investigations, the exact chemical nature of Bordeaux mixture was elucidated. Thus, of this fungicide it may be said that France discovered it, the United States demonstrated practically the efficacy of various modifications of the mixture, and England, through Mr. Pickering's labours, supplied the explanation of its true chemical composition.

With respect to the manner in which Bordeaux mixture exerts its fungicidal action, the last word is still to be said.

In the Eighth Report it was stated that “it seems to have been well established that the fungicidal action of Bordeaux mixture does not come into play until a week or more after it has been applied to the foliage,” and the opinion is expressed that this action depends on the amount of normal copper sulphate liberated from the Bordeaux mixture by the action of the carbon dioxide and moisture in the air. With regard to this point, we find, in the Eleventh Report, the statement that “There can be no doubt that some soluble copper is liberated from ordinary Bordeaux mixture (the mixture made of equal parts by weight of copper sulphate and quicklime) almost at once after it is applied, i.e., within a few hours, possibly within a few minutes.” This occurs, it is to be noted, even when an excess of lime is present, because, when the Bordeaux mixture is sprayed on to foliage, it dries up and the particles of basic sulphate of copper and of lime become separated from each other. Hence, when the former are attacked by the carbon dioxide, there may be no lime particles sufficiently close to decompose the copper sulphate formed. Analyses shows that (as Millardet and Gayon stated) some of this soluble copper penetrates into the cells of the sprayed leaf. In one case ten sprayed leaves of the Bismarck Apple were found to contain 0·0003 grams of copper. Mr. Pickering believes that this impregnation of the leaves with copper is one way in which Bordeaux mixture acts as a preventive agent; such “immunised” leaves affording an unsuitable medium for the growth of fungi; and the opinion is hazarded that “the copper doubtless passes gradually into the other parts of the tree and thus gets disseminated.” With respect to both these points, however, proof is required before the explanations here suggested can be accepted. We may note in passing one interesting point which the experiments estab-

blished, *viz.*, that in every case where copper is found to have passed into the leaf, iron passes out of the leaf.

In the present Report, also, another suggestion as to the mode of action of Bordeaux mixture is made. According to this, the efficacy of this mixture is probably not due merely to the gradual way in which the copper is rendered soluble, thus entailing a prolonged action, but to the fact that the carbonate of copper produced from the insoluble basic sulphates of copper by the action of the air is deposited in a very adherent form, and constitutes a protective covering over the leaves, sufficient to prevent fungus spores from germinating on them. This point, as we shall see, is one of considerable importance when estimating the value of the "Woburn Bordeaux paste." In leaving this part of the subject, we may mention that Mr. Pickering states that the chief and, he believes, the only agents which render the copper of the Bordeaux mixture soluble are the carbon dioxide and moisture in the air, and he concludes that substances excreted by the fungus spores or by the leaves of the plant do not normally play an active part in this process. Any fungicidal action on the part of the coating of copper carbonate on the leaf is to be attributed to the fact that it becomes soluble to a very slight extent, and thus prevents the germination of fungus spores which may settle on the sprayed leaf. The likelihood of a fungus spore, while boring its way into an epidermal cell, acting on the insoluble, basic sulphates of copper in such a way as to render some of the copper soluble, and thus bringing about its own death, is, in my opinion, dismissed with too little consideration.

With regard to the Woburn experiments on the best method of making ordinary Bordeaux mixture, the results obtained are of considerable practical importance. The Bordeaux mixture that gives the best results is well known to be that in which the precipitate (which forms as the results of the chemical action between the copper sulphate and the lime) is as finely divided as possible, since it will then settle in the liquid more slowly than when the precipitate is less finely divided. Hitherto it has been thought that the best method of mixing for ensuring this result was to dilute both the copper sulphate solution and the milk of lime, as far as possible, before mixing them together. Mr. Pickering now furnishes proof, showing that though the above method (which is that generally adopted in the United States and our Colonies) gives a very finely divided precipitate, a still finer precipitate is obtained—and, as the result, a slower "settling" of it in the fluid—if a solution of copper sulphate as strong as possible is poured into the "milk of lime," which has been diluted as much as possible. As in all previous investigations, it was found that the worst quality of Bordeaux mixture was obtained when strong solutions of both copper sulphate and lime were mixed together, and then diluted with water to the proper strength. In all the numerous practical points touched upon in this Report, Mr. Pickering has expressed the results in as plain a language as possible, and since the method of making the best quality of Bordeaux mixture is a matter of the greatest importance to the fruit-grower, we will repeat here the paragraph dealing with this subject:—"Take the lime in as weak a condition as possible, and, consequently, the copper sulphate in as strong a condition as possible, and add the sulphate to the lime. The milk of lime, after being diluted with the bulk of the water, and stirred up several times during about half an hour, should be left for the grosser particles to settle before the sulphate is added to it, and after the addition of this, very little more stirring should be done." Instead, therefore, of having to provide himself, as heretofore, with a wooden tub capable of holding half the quantity of the water, in which to dissolve the copper sulphate, the latter

may be dissolved in a wooden pail or stone jar (iron or tin receptacles must not be used) at the rate of 2 lbs. to the gallon of water. The quicklime (in lumps) may be slaked in a galvanised iron tank, and then made into milk of lime with the rest of the water. If the copper sulphate solution is poured into the middle of the tank, and not allowed to touch its sides, the copper will unite with the lime before it can affect the galvanised iron. The mixture must be used fresh, and the tank washed out with water.

It may be noted, as showing the closeness of scientific reasoning, that every feature of the different results obtained by Mr. Pickering when making Bordeaux mixture by different methods was found to be in strict accordance with what had been previously established as to the chemistry of the mixture. The account of this harmony of the practical with the theoretical results—given as it is in clear and simple language—is most instructive reading.

A word or two may be said here on the important point as to the best strength to make Bordeaux mixture for use on fruit trees. Mr. Pickering points out that, owing to the difference between the American gallon (8'345 lbs.) and the imperial gallon (10 lbs.), the strength of the mixture used commonly in the United States and our Colonies on fruit trees (Apples, Pears, Plums, Cherries, but not Peaches or Apricots), *viz.*, 8 lbs. copper sulphate, 8 lbs. quicklime, to 100 gallons (American), becomes altered to 9½ lbs. copper sulphate, 9½ lbs. quicklime to 100 gallons (imperial). Having regard to the fact, however, that excellent results have been obtained in this country with Bordeaux mixture made on the formula 8'8'100 (imperial gallons), and that some "scorching" may result with this mixture in certain seasons, we would certainly advise growers not to increase the amounts of copper sulphate and lime to 9½ lbs.

We must not leave the subject of Bordeaux mixture without mentioning the special form of it investigated by Mr. Pickering, and now known as the "Woburn Bordeaux mixture." In the eighth report attention was drawn to the fact that a number of different compounds (insoluble basic sulphate) are formed, according to the different proportions of copper sulphate and lime taken. To economise material, and at the same time to secure other advantages, as little lime as possible should be used consistent with throwing down all the copper. Full directions for making such a mixture (for which it is necessary to use "lime-water"—a clear liquid consisting of lime dissolved in water) were given in the eighth report. In that report it was shown that, according to its chemical composition, this form of the mixture—which, it may be mentioned, has been in common use in Italy since about 1886—should be 2½ times as efficient as ordinary Bordeaux mixture, if the efficiency is measured by the amount of copper sulphate which is ultimately reformed on exposure to the air. In the present report, as the results of experiments in which Bordeaux mixtures made in various ways were subjected to the action of carbon dioxide in the presence of water, the superiority of the Woburn Bordeaux mixture was found to be as 20 to 1—though, for certain reasons mentioned in the report, it is considered advisable to take a lower estimate of the relative efficiency, *viz.*, 12 to 1. But it must be remembered—and this is an important point—that if, as there are grounds for believing, the chief function of Bordeaux mixture lies in the protective covering of sprayed parts with copper carbonate and insoluble basic sulphates of copper, then the "Woburn Bordeaux mixture" would be much inferior to the ordinary mixture. It is a point that can only be settled, as Mr. Pickering points out, by experiments on a practical scale carried out by growers for several seasons. The "Woburn Bordeaux mixture" is admittedly more difficult to make than the ordinary mixture; it is best, therefore, for

the grower to purchase it in paste form. Mr. Pickering, working with Messrs. W. Voss and Co., has succeeded in preparing a paste, now put on the market under the name of the "Woburn Bordeaux paste" which, when diluted with water, reproduces a mixture which is practically identical, both chemically and physically, with the freshly-made "Woburn Bordeaux mixture."

This mixture in paste form must not be confused by growers with the proprietary "Bordeaux mixtures" in powder form (Strawsonite, &c.); such dried Bordeaux mixtures are, as Mr. Pickering points out, unsatisfactory, and should therefore be avoided by the up-to-date grower. Strawsonite and similar dried mixtures are made by adding lime slaked with very little water to a very strong solution of copper sulphate, and then drying and grinding the mixture. Mr. Pickering obtained evidence, similar to that obtained in 1900 by Mr. R. J. Moss (whose work is not here mentioned), showing that Bordeaux mixture made from powders are inferior chemically and physically to the freshly-made mixture. For instance, the power of Strawsonite of keeping in suspension is nearly ten times less than that of the ordinary freshly-prepared Bordeaux mixture.

We can only allude briefly to some of the many other discoveries of practical importance announced in this Report. In connection with the "scorching" which occasionally results on the leaves and fruit of certain varieties of Apples, Mr. Pickering discusses critically the work of Professor U. P. Hedrick and of Professor C. S. Crandall, of the United States, and reviews it, together with the results of his own spraying experiments, in the light of our new knowledge of the chemistry of Bordeaux mixture. The conclusion is arrived at that some amount of injury to sprayed trees must be expected occasionally in England, as has been found to be the case in other countries, but that, on the average, the good done by Bordeaux mixture far outweighs the harm.

The chemistry of "Soda Bordeaux," made by mixing copper sulphate and carbonate of soda ("washing soda") is fully explained. It is a curious fact—and one showing how greatly research work is needed—that, until 1909, when Mr. Pickering communicated to the Chemical Society the paper, entitled "The Carbonates of Copper and the Cupricarbonates" (reprinted as Appendix to the present report), the chemistry of this mixture was unknown, although it has been used extensively for many years in Ireland and elsewhere. Mr. Pickering, from his chemical standpoint, does not advise the use of "Soda Bordeaux," and states that it is unlikely, on account of the insolubility of the copper compounds formed, to be a satisfactory fungicide. We should like to mention, however, that we have used it on a fairly large scale for the past two years, and found it efficacious, when sprayed on Potatoes, in keeping off the "blight."

Some interesting reasons are given why the addition of treacle to Bordeaux mixture is inadvisable. Experiments have shown that nicotine may be safely added to Bordeaux mixture.—E. S. S. in *The Gardeners' Chronicle*.

—:O:—

"Tsamba," a mixture of tea, butter and salt, is universally esteemed throughout Mongolia and Thibet. Tsamba is made as follows: Tea is powdered in a wooden mortar, and is then poured with salt and butter into boiling water. The butter is obtained from the milk of sheep or goats. This is well mixed, boiled milk and salt are added, and the whole is then boiled once more. The beverage thus prepared is not so nasty but that one may soon become accustomed to it.

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(INCORPORATED.)

The Scientific Officer.

In a letter dated Coonoor, May 31, 1910, to the Secretary, U. P. A. S. I., Mr. R. D. Anstead, B.A., remarks :—

"My attention has been called to the fact that objection is taken by some planters to my title of 'Planting Expert.' These gentlemen contend that they were planting before I was born, and they prefer the title of 'Scientific Officer.'

"Though there might possibly be something to be said in reply to this argument, I should be glad if you would take an early opportunity to explain, through the medium of the *Planters' Chronicle* that my official title was not of my choosing. Being a Government servant, I was gazetted as 'Planting Expert,' and, though it may have much to recommend it, the post of Scientific Officer does not exist in Southern India as far as the Government is concerned.

"I do not wish to set my knowledge as an expert above that of lifelong planters in any way, as I quite realise that I have much to learn from them, and I very much regret that my official title should have given offence, but after this explanation I trust that it will be recognised that the fault does not lie with me."

Mr. Anstead is expected to return to Headquarters next week, and will remain there till the end of June, if not longer.

Cochin Planters' Association.

This Association has been informed that its application for affiliation to the U. P. A. S. I., has been granted by the Council.

The P. B. F.

Encouraging advices as to promised subscriptions to the S. I. Planters' 'Benevolent Fund' are coming in, and the total of names to be entered in connection with the Hon'ble Mr. J. G. Hamilton's scheme for the enlistment of twenty Life Members has now risen to four. As the official year of the U. P. A. S. I. will close on the 30th instant, District Planters' Associations are requested to collect and remit as many subscriptions as possible before that date, so that the amounts may be entered in the current year's accounts.

Volume IV.

There will be three or four copies of the bound volume of the *Planters' Chronicle*, February 1909 to January 1910, available next week. The number is very small owing to an insufficiency of spare copies of the issues during the first half of the year.

Scientific Officer's Papers.**XXX.—SCALE INSECTS AFFECTING COFFEE ESTATES.***(Continued.)****Lecanium nigrum* (Black Bug.)**

Strictly speaking this is not a Coffee pest, but it may be described here to complete the *Lecanium* group of common scales :—

It is an oval scale about twice as long as broad, with a narrow flattened margin, colour deep brown or smooth shining black.

This scale usually occurs on the leaves of Ceará Rubber, and on the young shoots of Pará Rubber. It does not at present appear to be a serious pest. Ceará sheds its leaves each year and, if badly attacked, the leaves might be collected and buried and a tar ring painted round the trunks of the trees to prevent the young scales which have hatched out on the fallen leaves from crawling up on to the trees again.

***Pulvinaria psidii* (Green Mealy Scale.)**

This is known by several popular names, such as Green Bug, Black Bug, and Mealy Bug. It is found on the shade trees as a rule, and sometimes on the Coffee beneath and near them, though it is not often a very serious pest in the Coffee. The harm done is due to the killing, or weakening, of the shade trees, and the scale is usually accompanied by Black Blight.

The full grown scale is covered with a mass of white, cottony, wax, which lies behind and under it masking its real green colour. In this wax the eggs are laid. The eggs hatch out into very minute insects, so small that they are almost invisible to the unaided eye. Those run about actively until they find a suitable place to feed; they then settle down and insert their sucking beaks into the twig or leaf, and as they grow they moult twice and are then mature. Eggs are next laid either in situ, or the insect moves to the lower side of a branch. At this full grown stage the scale is flat and green, but as the eggs and cottony mass behind it increase it shrivels up, and finally little is to be seen except the white mass of wax with a dark spot, the remains of the scale, at one end. In the half grown stages the scale is something like the Pulney Bug (*Lecanium viride*) and is sometimes mistaken for it. The latter, however, never produces any white wax at any stages of its existence. The Mealy Bug, too, is of a slightly different shape to the Pulney Bug, and when examined under a magnifying glass is seen to have either no markings at all, or faint parallel dark lines down the back with small white dots of wax.

Pulvinaria psidii is widely spread and attacks a large variety of trees, and in a favourable locality and under favourable climate conditions it may spread rapidly.

Remedies.—The following methods of treatment have been recommended:—

- (1). Shade trees known to be commonly attacked by this scale should be gradually removed from the Coffee, and replaced by others not attacked by the scale.
- (2). A four-inch ring of tar may be painted round the trunk of attacked trees above the coffee. This will prevent young scales which have hatched out on fallen leaves crawling up from the ground to find a suitable feeding place on the trees.
- (3). Spraying, especially of the coffee which may be attacked by the scale below infested shade trees.

Dactilopius citri (Mealy Bug.)

This is a true Mealy Bug and is found chiefly on the roots of the Coffee especially in Coorg. The full grown scale is oval in shape; the ground colour is light brown, and it is covered all over with a mealy wax and has short, white, hair-like, processes on the margin of the body. The eggs are yellow and are laid in a mass of white cottony wax under the body. These eggs hatch out into minute yellow insects which walk about till they find a suitable feeding place. The scale is active in fact throughout the whole of its life.

It usually occurs on the roots of the coffee a few inches below ground, and it kills these roots so that the Coffee, and especially young Coffee, cannot grow.

This scale also occurs on the roots of *Erythrina lithosperma*, and of several weeds such as Goat or white weed (*Ageratum mexicanum*.)

Remedies. The remedies recommended may be stated briefly as follows:—

- (1.) Nursery plants should be grown in baskets in a mixture of powdered sulphur 1 part, lime 1 part, and soil 70 parts.
- (2.) Young plants in the field as soon as attacked should be watered with a tobacco wash made by dissolving 12 lbs of hard soap in hot water and mixing the solution with a tobacco extract made by soaking 24 lbs of tobacco in 24 gallons of cold water for a day. The mixture is made up finally to 100 gallons. This treatment should be supplemented by applying a mixture of lime and sulphur in equal proportions round the roots.
- (3.) A heavy dressing of lime and sulphur in the proportions of 8 to 1 may be applied to badly infested land at the rate of about 10 cwt. per acre.

(See also *Planters' Chronicle* Vol. V, p. 3.)

MEANS OF DISTRIBUTION.

Scales spread from place to place on individual plants, and from one plant to another in the immediate neighbourhood, by crawling in their young stages as already described.

They are distributed over wide areas, and from district to district by many different agencies. The wind blows dead leaves covered with scales and eggs considerable distances. Animals such as birds, monkeys and even bigger game brush off young scales which get entangled in their feathers and fur and carry them long distances. When the animals settle down to rest these passengers may crawl off them and if they find a suitable host plant may settle down and start a colony in a heretofore uninfected place. Without doubt also scale insects may be carried from place to place in a similar way by coolies on their cumblies, and this accounts for the fact that the first attack in a new district so often occurs by road sides, and by the sides of paths through the coffee. Coolies who have come from scale infested districts are very apt to carry young scales on their cumblies, and may easily brush them off against the coffee overhanging paths and roads.

Finally, scales may be introduced from one district to another on plants and great care should be taken by districts which have not yet got the *Pulney Bug* (*Lecanium viride*) not to introduce it on plants imported from districts known to suffer from that pest.

ANTS AND SCALES.

Plants attacked by scales are usually found to be infested with ants of various sorts. These ants do not feed upon the scales, as is sometimes popularly supposed, but on the sugary fluid excreted by them, and far from destroying them, some kinds of ants have learned to protect the scales and tend them much in the same way that man keeps cows. These ants play a considerable part in the local distribution of such scales, and must be taken into account when dealing with these pests. During the monsoon, which is an unfavourable time for scales, eggs and young scales will be found stored and protected in the nests of brown ants; when the monsoon period is over the ants carry these out of the nest and place them on the young shoots of the coffee where they can feed. Other kinds of ants build clay shelters over the scales on the branches to protect them during the monsoon, or other unfavourable climatic seasons.

(See *Planters' Chronicle*, Vol. IV, p. 317).

(To be continued.)

RUDOLPH D. ANSTEAD,

Planting Expert.

Bordeaux Mixture.

In the current number of the "Board of Agriculture Journal," there is a paper by Mr. E. S. Salmon, F.L.S., Mycologist to the South Eastern Agricultural College, Wye, Kent, on "The Making and Application of Bordeaux Mixture." . . . The Bordeaux mixture recommended for spraying fruit-trees is of the strength known as 4-4-50 (Imperial), and the importance of using wooden vessels is urged. The mixture should always be freshly made, as it is difficult to keep the gelatinous precipitate in suspension if more than a day old. . . . No additions should be made to the Bordeaux mixture, treacle and soap sometimes used being unnecessary. Mr. Salmon objects to powder and paste forms of Bordeaux mixture, as the resulting liquid settles much quicker than when the chemicals are combined in dilute solution. The production of a ready-made form of the mixture that would be free from this objection is worth investigating, as, no matter how explicitly the directions are given for making Bordeaux mixture, the number of farmers who are able to carry them out successfully is small. With the spread of scientific knowledge among agriculturists this difficulty should disappear. The article deals exhaustively with the spraying-machines and nozzles with which Bordeaux mixture is used. The spray produced must be very fine and "misty" or smoke-like: a hanging "mist" or "fog" must be produced, which drifts over and through the tree, and deposits on the surface of the leaves excessively minute drops, which when dry give the parts of the trees that have been sprayed the appearance of being almost uniformly covered with a very thin bluish film or dust. Such a deposit is so intimately attached to the surface of the leaf or fruit that it does not readily wash off. The points to be considered about spraying-machines are (1) the machine and its chief working parts must be made of material which the spray solution will not affect chemically, (2) the pump must be powerful enough to maintain a pressure sufficient for the particular nozzle used, and (3) the build of the machine must be suitable for use in the particular plantations or orchards to be sprayed.—*Chemist and Druggist*, January 1910.

Notes and Comments by the Solentifo Officer.

41. *Spread of Scale Insects.*—Flying insects which frequent scale infested plants unintentionally effect the carriage of young scales to other plants. Even beneficial lady-birds, when feeding on scale insects may become the temporary resting place for the active young scale insects which are wandering about, looking for a suitable place to settle down. When the lady-bird flies off and alights on another plant, the unwelcome passengers may crawl off and, if the new plant is suitable to their requirements, settle down and establish a new centre of infestation. Such accidental means of spreading to hitherto non-infested plants are probably one of the many factors in the distribution of Scale Insects.

42. *Passiflora as a Green Dressing.*—In my report upon a tour in Travancore it was mentioned that when *Passiflora foetida* is used as a green dressing, it should be planted out from nurseries in beds down the rows and cultivated. ("P. C." Vol. V, p. 186).

The following account of how best to grow *Passiflora* as a green dressing in Rubber has been received from Mr. G. Atkins, of Mundakayam Estate. Mr. Atkins has had a good deal of success with *Passiflora* and by his method establishes a complete covering of it:—

"About 5 lbs. of seed was sown broadcast in an open abandoned Nursery about end of April; Creepers were taken out in July 9 inches long and planted in the following manner in a field of 20 acres of rubber. Midway between each line a single continuous ridge was raised about 1 foot in height and on this Creepers were dibbled in at 1 ft. apart; the field had been first forked and clean weeded.

"During August and September growth of *Passiflora* was very thin; by end of October, however, it had practically covered the whole ground. I found it necessary to occasionally weed to end of December. From January to March no weeding was done, but I have now again to go in for occasional weeding. The passion vine appears to thrive better in alluvial than in a gravel soil; and I think it is necessary to plant it closer in the latter kind of soil.

"There is no question about it preventing wash, and to a considerable extent it prevents weeds from coming up. It of course should be evenly planted, and grown thick if the object is to keep down weeds.

"I cannot say that the rubber has in any way benefited from it so far. My object is to let it grow for the present, and in November or January next to cut it up and fork it in as a dead mulch for the wet weather. And I feel certain that I shall then get the full benefit from the creeper. It is such an easy plant to grow and gives such a good cover to the ground, that I mean to give it a very careful trial before condemning it in any way. I shall be very glad to place the results of my little experiment here at your disposal."

Probably it would be a better plan to leave the cover growing during the dry season, or if cut over to leave it as a dry mulch on the surface instead of digging it in. It could be forked in at the end of the dry season just before a new crop was planted out to prevent wash during the monsoon.

RUDOLPH D. ANSTEAD,

Planting Expert.

DISTRICT PLANTERS' ASSOCIATIONS.**Nilgiri Planters' Association.****ANNUAL GENERAL MEETING.**

At the Annual General Meeting held on May 27, 1910, the following members were present :—

Mr. Stewart Brown in the chair, Mr. J. Harding Pascoe, Mr. E. Hardy, Mr. R. Bake, Mr. A. S. Dandison, Mr. G. Oakes, Mr. J. H. Wapshare, Mr. H. D. Wilbraham, Mr. Norman Grey, Mr. W. A. Cherry, Mr. H. H. Hudson, Mr. K. Langley, Visitor, Mr. E. R. Russell, and Mr. R. D. Anstead, Scientific Officer.

ANNUAL REPORT.

The following annual report was read by Mr. Pascoe and on the proposition of Mr. H. D. Wilbraham, seconded by Mr. Norman Grey, was unanimously adopted.

" Gentlemen, I have to submit my annual report and the accounts for the year ending 31st December last. Rs.109-7-9 were brought forward from 1908, Rs.1,104-4-0 were paid in annual subscriptions and Rs.1,325 on account of the Scientific Officer fund. General expenses and subscriptions to the U. P. A. S. I. amounted to Rs.1,003-15-5 and Scientific Officers' expenses and subscription to Scientific Officers' fund to Rs.1,124-8-0. The closing balance was Rs.679-1-0, of which Rs.237-9-0 belongs to the general fund and Rs.441-8-0 to Scientific Officer fund. Cash in hand and at Bank was Rs.418-1-0. Since the end of the year I found out that the acreage in the holding of members was much understated, therefore I sent a further subscription to the U. P. A. S. I. making a total of Rs.625 and also the Committee decided to increase the Scientific Officer fund subscription to Rs.1,250.

I am glad to say that subscriptions for 1909 remain due by 2 members only, but promised subscriptions to the Scientific Officer fund show a far larger sum outstanding, and I very much regret to say that one firm of repute in the Presidency has repudiated and refused to pay its promised subscription. I shall be happy to give any member the name of that firm in confidence and trust by doing so that they will get little support from this District.

Our thanks are due to those firms who have helped us generously, and I may particularly instance Messrs Volkart Brothers, T. Stanes and Co., and the Anupura works. Unfortunately I was too late in getting hold of Messrs. Peirce, Leslie and Co., whose subscription had been influenced already by the Wynaad. The number of members has increased to 62 from 48, an increase of 30 per cent. at the end of the year.

ACREAGE AND SUBSCRIPTION.

I have been told (though the actual complaints come from two members only) that the present basis of subscription does not give general satisfaction. It is for you to decide if any alteration is to be made. Be this as it may, it is not fair that any member should declare a short acreage or fail to pay his full subscription under the rules. My circulars on the matter have met with scant response. I am sorry for a man who is so hard-up that he must perjure his soul for the sake of Rs.10, and recommend to his notice the advantages of the Planters' Benevolent Fund.

2. Since I have been Secretary, I have tried hard to induce men to join the Association. I think I can claim but little success, and I have

been surprised at some of the answers I have received. The gist of them would be:

- (1). The Association does no good ; if I thought it did, I would join.
- (2). No, thanks ; too much of a one man show for me.
- (3). I was a member, but things went contrary to my wishes, or opinion, at one meeting, so I chucked and see no reason for rejoining.

No. 1 is a confession of selfishness. If the Association does no good, which I will not admit, it is because so many withhold from joining. Certainly the Association cannot do so much good when it only partially represents the District.

No. 2—Seeing that each member has a vote and that each vote is of equal value, this is a confession of invertebrate weakness that I should not care to make myself.

No. 3 is equivalent to the 'shan't play' of a child that gets beaten at a game. Most men outgrow this phase by the time they are 7, a few apparently do not.

The truth is, there is an insidious disease creeping through the district. It may be a scale, or it may be a fungus. Anyway, it is worse than Green Bug, and a friend of mine has aptly named it "Blue Mountain Rot." I hope it may be eradicated in time. Mr. Ainstead recommends ginger.

I do not think it is necessary for me to touch upon matters that have come before us during the year, but I must express regret that Lady Lawley's generous offer with regard to the Lady Amptill Nursing Institute was refused, and I must also point out that the Planters' Benevolent Fund has received little or no support in this district as yet. This matter is on the agenda.

It is now customary for the Honorary Secretary to thank members for their kindness and help, but I do not see any reason for perpetuating this sarcasm. It only remains for me to place the resignations of the Committee and myself in your hands."

(Sd.) E. F. BARBER.

OFFICE-BEARERS.

Proposed by Mr. Wilbraham and seconded by Mr. Norman Grey, that Mr. E. F. Barber be re-elected Honorary Secretary and that the same Committee as last year be re-elected. Carried.

BONUS ON GREEN TEA.

Proposed by Mr. Stewart Brown, that the proposed scheme of asking for a bonus on green tea does not meet with the support of the Association. Seconded by Mr. Cherry, and carried.

CINCHONA.

Proposed by Mr. Stewart Brown and Seconded by Mr. Cherry, that Mr. H. P. Hodgson's letter be adopted. Carried.

Mr. H. P. Hodgson's letter runs:—

"With reference to the Hon'ble Mr. J. G. Hamilton's letter of the 18th April 1910, I understand that any arrangement between planters and the Government must be on a commercial basis.

"I would suggest that if on the one hand the Government will consent to buy bark up to their requirements at a minimum rate of one anna per unit that planters should agree to give Government the first offer of their bark at rates up to a maximum of two annas per unit. This would ensure to Government a supply of bark within a maximum of two annas per unit,

should bark rise above that price either through a combination of Java planters or from any other cause, and would enable planters to retain their plantations instead of rooting them up to plant a more profitable product.

"In my opinion from a commercial and economic point of view this would constitute a fair basis of agreement. I should be prepared to enter into such an agreement for my estates in the Nilgiris and Anamalais."

SOUTH INDIAN RAILWAY.

Proposed by Mr. Dandison, that the Railway be furnished with any information it may require and that the Association will be willing to consider any plan formulated for meeting the traffic difficulties with estates. Seconded by Mr. Hardy, and carried.

NON-SERVICE OF WARRANTS.

Proposed by Mr. Pascoe, that a cordial vote of thanks be passed to the Collector for the trouble he has taken in the matter of the non-service of warrants and that this Association accepts Mr. Francis' proposal that a trial for one year be given to his suggestion that all warrants should be served through the police and not handed to maistries. Seconded by Mr. Dandison, and carried.

With reference to a letter from Mr. Wapshare, it was proposed by Mr. Wapshare and seconded by Mr. Hardy, that this Association write to the U. P. A. S. I., to move the Government of Mysore to permit of the attesting of cooly contracts by Amildars and other officials in the Mysore State, since just now it is impossible to get cooly agreements attested. Seconded by Mr. Hardy, and carried.

"Mr. Wapshare's letter referred to reads:—

"A lot of my Canarese maistries have complained to me that they cannot get the officials in the villages in the Mysore State to attest cooly agreements. Neither will the Post Office people do it. The maistries say that they have the greatest difficulty in advancing coolies in the Mysore country. On rare occasions the officials do it but only after the maistry has to take his cooly to the attesting officer about $\frac{1}{2}$ a dozen times! Cannot something be done through our Association to ask the Government of Mysore to get their Amildars, etc., to attest cooly agreements.

"My Maistries in British India do not seem to have any bother in this respect. Will you please lay this matter before the meeting to be held on the 27th instant."

SCIENTIFIC OFFICER.

Proposed by Mr. Wilbraham, that the U. P. A. S. I. be requested to utilize part of their Reserve Fund in providing a Laboratory for the use of the Scientific Officer, as the Nilgiri Planters' Association consider that without a laboratory the planters of South India are not getting the full benefit of the Scientific Officer's services. Seconded by Mr. Pascoe and carried unanimously.

In this connection Mr. Wilbraham said:—"I bring forward this resolution to invite discussion on the subject. Hundreds of acres have already been destroyed by pest, and if it continues to increase as it has done in the past year there will soon be very little coffee left in the N. E. parts of the District and no Estates to pay subscriptions to the Association and special funds. Spraying, on account of its expense and the fact that the surrounding jungle is full of the green bug, is, I fear, impracticable, and a Pest Act it seems, if passed by Government, which I very much doubt being done, would be so hard to administer that it will be useless. We have a fungus which in wet weather appears and then spreads rapidly. I would like to

ask our Scientific Officer if it would not be possible to produce a more vigorous growth of the fungus, which being more virulent might thrive at an earlier season in the year than the natural fungus does and which might be applied by the individual planter wherever he thinks that owing to climatic conditions there is a chance of its spreading.

DELEGATES FOR THE U. P. A. S. I. MEETING.

Proposed by Mr. Stewart Brown, that Mr. Barber and Mr. H. P. Hodgson (if in India) be asked to go to Bangalore. Seconded by Mr. Pascoe, and carried.

Proposed by Mr. Oakes, that Mr. Deane as well be asked to attend the U. P. A. S. I. Conference, since it was intended to send down three delegates at a cost of Rs.200. Seconded by Mr. Cherry, and carried.

Proposed by Mr. Grey, that Mr. Pascoe be elected to attend the U. P. A. S. I. Meeting (as a stopgap). Seconded by Mr. Cherry, and carried unanimously.

Resolved that the Association's delegates be given a free hand, that they carry out the policy pursued by the Association's delegates in previous years and that they press the question of providing a laboratory for the Scientific Officer.

PLANTERS' BENEVOLENT FUND.

It was decided that the Honorary Secretary should act on the lines suggested by the Chairman of the U. P. A. S. I.

HONORARY MEMBERS.

Proposed by Mr. Wilbraham and seconded by Mr. Oakes, that Mr. Anstead, Mr. Hudson and Mr. McRae be elected Honorary Members of the Association. Carried.

ACREAGE AND SUBSCRIPTION.

Resolved, that the general feeling of the meeting is that the present system of subscriptions be allowed to stand.

MALABAR COMPENSATION ACT.

Proposed by Mr. Wilbraham and seconded by Mr. Wapshare, that this Association is of opinion that the Malabar Tenancy Improvement Act should be applied to this District.

VOTE OF THANKS.

A vote of thanks was carried unanimously to Mr. Barber for the services he had rendered as Honorary Secretary and to Mr. Stewart Brown for having taken the chair.

A vote of thanks to Captain Plumer for the use of the room closed the proceedings.

(Sd.) N. STEWART BROWN, *Chairman*.

MR. ANSTEAD'S ADDRESS.

Mr. Anstead addressed the meeting as follows :—

I should like to preface my remarks by thanking you for the welcome which you have again given me to your District, and for electing me an honorary member of this Association, an honour which I am very glad to accept. I have also to thank you for the way in which you have just received my request for a laboratory to enable one to carry out my work.

Since I last had the pleasure of addressing you, almost a year ago, I have visited nearly all the planting districts in Southern India, and it appears to me that the position of coffee in the majority of places is this: that with the present prices when it is attacked badly by disease, it will not bear the cost of the application of remedies like spraying. The consequence is some other plan must be adopted to fight a pest like green bug (*Lecanium viride*) and the best plan is to obtain hybrid coffee bushes and plant them in place

of the ordinary Arabian coffee ; hybrids which will give a bigger yield than Arabian coffee, and which are disease-resistant. Such hybrids are not difficult to obtain, and in many districts, including the Nilgiris, excellent hybrids between Arabian and Liberian coffee exist. These form large sturdy bushes, which in some instances give big yields. They are almost entirely free from leaf disease, and though those I saw a few days ago were attacked by green bug, the effect upon them was slight. The cross had given them sufficient vigour to resist the attack and to a great extent throw it off.

I have described in recent numbers of the *Planters' Chronicle* (Vol V, Nos. 12 and 13) the process of cross-fertilising coffee in order to produce new hybrids, and shown how by self-fertilisation of the hybrid the type can be fixed, and seed come true in accordance with Mendel's Law.

Now, gentlemen, I claim that this is a practical scheme, and one worthy of the attention of practical planters like yourselves. I claim that it is practical to gradually replace the whole of the existing diseased coffee by strong vigorous hybrids which are disease-resistant, give bigger crops per acre, and a berry which yields a coffee of better quality, for while making hybrids there is no reason why they should not be bred for quality of the bean as well as for crop and disease resistance. Turn to any other crop you will, and you will find plants improved by breeding being grown. Some comparatively few years ago the cane sugar industry in the West Indies was threatened with extinction by falling prices, owing to the competition of beet sugar, and disease-riddled canes. Now the sugar industry there is a thriving one, because hybrid canes were bred, which not only have a largely increased sugar content, but are disease-resistant to a high degree. Again, the cotton grown during the last five or six years with such marked success in the West Indies and other British Colonies is a long-stapled cotton produced by careful breeding and selection.

All the great food crops of the world are grown on the same lines. Wheat has been so improved by plant breeding in England that the yield has been trebled, and rust is no longer the curse it was. Each year we see seed potatoes put on the market and fetching huge prices because they are disease-resistant : they have been bred. Fruit again is all produced by carefully bred hybrids ; coffee alone seems to have received no attention along these lines. Some years ago some experiments were begun in Mysore and elsewhere, but these were largely abandoned because the first hybrids produced were not satisfactory. This is a thousand pities, for many valuable years have been lost. In my opinion the salvation of the coffee planter of S. India lies along lines of plant breeding, and it is a better way of fighting a pest like green bug than all the sprays which have been invented.

You may say that it is slow and tedious work which should be undertaken by Agricultural Stations and Government Gardens. I do not propose to argue about that, but while you are persuading public bodies to take up this work you will lose more valuable years. It is work which any planter can do for himself, and the only drawback is the time required to produce bearing hybrids of the desired type. That, however, is all the more reason why the work should be begun at once.

Possibly this Planters' Association may be able to see its way to have definite breeding grounds laid out on some estate, and undertake to see that the work is carried out. I need, I hope, hardly say that I shall be glad to give all the aid in my power.

You have a starting point already ; hybrids exist on the Nilgiris, and excellent hybrids too. I had the pleasure of inspecting some only a few days ago, and I look forward to the time when there will be hundreds of acres of these, bearing heavily and disease free.

To turn for a minute to more direct methods of dealing with green bug, the last time I was here I recommended, among other things, the pruning of infested trees, the prunings being burned, manuring, and keeping the ground well covered with a mulch, at the same time getting rid of all bug-infested weeds and shade trees.

I have just been visiting the Kullakambai District, where last year the bug was so bad. Here my advice was carried out; the trees were pruned, the prunings were burned, and the ground was heavily mulched, at the same time the trees were given a dressing of cattle manure. When this was done, the method met with a quicker response than I had dared to hope for. The bug had largely disappeared, and many acres which on my former visit were black and smothered with scale and almost denuded of leaf are now covered with healthy foliage and strong bearing wood. Could these areas be now sprayed to kill the few scales which remain, I believe that the bug would be beaten and the trees regain their old health and vigour. So long, however, as the scale is on so large a number of the forest trees, the attack will be a recurring one and will probably be bad every year when there is an extra prolonged drought.

Since I was here last year I have seen in different districts a great deal of rubber, and I am very much struck with the possibilities of Ceará in districts which will not grow Pará, especially districts with a low rainfall of about 70 inches and less.

In many districts in the Nilgiris—I do not say in all, but in many—Ceará will grow well, and is growing well, and I think that it is another weapon in the hands of coffee planters with which to fight against falling fortunes. Many coffee estates have planted Ceará, which could be successfully cultivated in areas, and the return from them would, I think, tide over the thin years through which we are passing.

Ceará will not stand wind, and it is a very variable plant. In an acre of it trees will be found which, when tapped, give anything from a few ounces to a pound of rubber. To ensure having a plantation of the best kind, land should be planted up as far as possible with cuttings taken from a tree which is known to be a good yielder. Cuttings grow readily and come true to type, which seed does not.

I am often asked about the new Manihot varieties of rubber, and I must say that most of them which I have seen have been disappointing. Not only is it difficult to germinate the seed, but the plants are apt to grow badly and often twisted. However, yesterday I had the pleasure of seeing an acre of *Dichotoma* and *Pyauhyensis* which I can only describe as delightful. These were in a light soil, at an elevation of 5,450 ft., with an annual rainfall of 50 inches; they were a year old from planting, and averaged 6 to 8 ft. in height, straight and clear, and branching about 3 ft. from the ground.

I am still as keen as ever on the use of leguminous green dressings for tea, coffee, and rubber. During the year I have diligently examined the local flora of each district I have visited for suitable plants for the purpose, and I have found a great many. The best of all I have seen is a common weed in your charming district, a plant recommended about a year ago by a member of this association. This is known botanically as *Cassia mimosoides*, and Mr. Dandison has kindly brought in a specimen of it to show you—a specimen of a single plant, which as a cover plant speaks for itself and needs no words of mine to recommend it.

About tea I need say little. You are luckily free from mosquito blight, and from what I have seen, I should say that the Nilgiris have a great future before them as a tea district.

CORRESPONDENCE.**Growth and Colour of Para Rubber.**

Periyar Rubber Company, Ltd.

Thattakaad P. O.,

May 26, 1910.

Mr. Vincent's deductions with reference to the growth or girth of Pará Rubber trees in your issue of the 14th inst., appear to me most interesting. The outcome of his observations being that the difference between the basal and foot measurement on nearly all trees will give you the approximate girth that tree will put on during the year.

I confess I was sceptical of his figures as applied to trees here, as he gives his annual increase of girth as under 4" in all cases, and I already knew that my trees did more than this. I have, however, now found that his figures will apply to older trees with a greater increase of girth than his trees. In our 1902 planting, twenty-trees measured consecutively, of which one has not been tapped, are as follows, basal measurement followed by 3 foot measurement. 36 to 28, 33 to 26, 31 to 24, 32 to 27, 20 to 16, 50 to, 43, 46 to 38, 40 to 35, 40 to 32, 30 to 24, 26 to 21. 35 to 30, 32 to 26, 38 to 33, 38 to 34, 29 to 24, 32 to 25, 32 to 27, 29 to 23, 30 to 25. Here the girth varies between 4" and 8", with an average increase of nearly 6". This is approximately what the trees are putting on annually, and bears out Mr. Vincent's theory.

The following measurements of our younger fields, planted June 1906 may also be of interest. Three individual trees only. Measured at 3 foot June 1908—12½"; June 1909—19"; May 1910—24". A double stemmed tree that had one stem sawn off, has increased in girth 8" during last year, the two stems having been below the average originally.

As regards the dark colour of rubber alluded to by the Scientific Officer. I have had practical proof that the drought affects the rubber by turning it darker. From February on this year my rubber became darker. There was no tapping during March. On restarting tapping in April, before the drought had broken up, my rubber started dark in colour and gradually by the end of April returned to its proper golden colour, without any alteration in its preparation.

Yours etc.,

(Sd.) H. B. KIRK.

The British Acting Consul-General at Rio de Janeiro (Mr. E. Hambloch) reports that, according to an article in a Brazilian rubber trade newspaper, the Government of the State of Pará have sent a message to the State Congress suggesting that rubber planters should be encouraged to start cultivating in regions more easily accessible from the coast. The Government is showing itself alive to the necessity of regulating the output, by fixing the period in which the first tapping shall take place and the height of the trees above the ground.

The same article states that the Federal Government has decided to make a determined effort to develop rubber exploitation and planting according to the most modern and scientific methods. A proposal is under consideration to offer, to such people as are willing to plant at least a million trees, free land and exemption from taxes and from export duties on rubber for a long period, the Government to participate in the profits of the enterprise. Trials are to be made first of all in the Acre district, the only territory of which the Federal Government is ground landlord. The soil and climate of this district are known to be suitable for the cultivation of rubber, but the difficulties of transport to the coast and of the supply of labour are likely to be very considerable.

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THE U. P. A. S. I.

(INCORPORATED.)

The Scientific Officer.

Mr. R. D. Anstead returned to head-quarters on the morning of the 7th instant.

"Chakte Sappu."

In the *Planters' Chronicle* of 26th March (Vol. V, p. 113) the question was raised as to the identity of a leguminous plant known in Canarese as '*Chakte Sappu*,' or '*Chakte Gidda*,' and it was there stated that some seed of this plant had been sent to the U. P. A. S. I. Plants have been successfully raised from this seed, and they have been identified as *Cassia Tora*.

This is an exceedingly common weed on the maidan in some districts, and very widely distributed. In Mysore where the bamboo had flowered, and had died and been burned, this plant was coming up, and growing almost to the exclusion of all other weeds. Unfortunately, however, it is of little value as a green dressing, for though it supplies a fair amount of green material, it has very few root nodules, and is probably deficient as a Nitrogen catcher.

The original correspondent, Mr. S. L. Mathias, of Sallebile, who asked for the botanical name of the plant, writes as follows with regard to it:—

"I know, that the seeds of these plants are used as food for cattle and he-buffaloes to gain strength and there is good demand for the seed in South Canara.

"That the tender leaves, or '*Sapper*,' of these plants are used by poor classes in South Canara to make curry, or a dish to eat with rice,

"As far as I believe, it is not eaten up by wild animals, which is a great advantage. I tried last year in my coffee estates, Groundnut and Sun-hemp as leguminous plants, but they were all eaten up by wild animals, and so could not be tested. The planters would certainly like such leguminous plants which are not subject to the depredations of animals. I know that the '*Sapper*,' or leaves of '*Chakte Gidda*' are used for cattle-feed, and am told that the use is appreciated very much. But it is not available in large quantities. It does not grow to a height of more than 2 feet, which is a distinct advantage in Coffee.

"Of course, plants that creep over the surface of the soil, such as Groundnut, &c., will serve better, but will be impracticable to grow as long as they are eaten up by wild animals."

From this it would appear that the plant is a very useful one for some purposes, and probably the best way to use it would be as bedding for cattle, and as absorbent material in cattle manure.

The best weed for the purpose of green dressings at present discovered is *Cassia mimosoides*. It is common in Mysore, and is as far as known not eaten by wild animals.

A MEANS FOR PREPARING PARA RUBBER.

The *Journal d'Agriculture Tropicale* contains, in a recent number, an account of a method known as the Purub process for coagulating the latex of *Hevea brasiliensis*. Purub is a contraction of the words 'pure rubber,' and is an invention brought out by Dr. Sandmann.

The process consists in the addition of water to the fresh latex, to which, after a fine cloth has been passed through it, there is added a solution of Purub of 1 per cent. strength, the mixture being stirred. After this has been allowed to stand for several hours, the rubber, which has collected on the surface, is skimmed off, and as much of the water pressed out of it as possible. Prepared in this way, it is soon ready for dispatch from the estate.

The active agent in the coagulation is hydrofluoric acid. This may be replaced by a 10 per cent. solution of hydrofluosilicic acid at the rate of 5 c.c. of the solution to each litre of the raw latex. The acid salts of these acids, such as potassium and sodium fluoride, potassium, sodium or zinc silicofluorides, either in the solid state or in solution, may be employed for the purpose.

The chief advantage of this process is to reduce considerably the amount of impurities in the rubber; these are retained to a great extent by the settlement of the heavier among them during the process of coagulation. In addition to this, hydrofluoric acid, being an antiseptic body, kills all putrefactive germs; rubber prepared by its aid never becomes viscous. Smoked rubber possesses this characteristic as well, but the smoking process adds impurities to it, and makes it black in colour. In the Purub process, this is all avoided, and there are the additional advantages that it is more speedy and requires less labour. There are other advantages, too, in that all injurious organisms are destroyed, even in the interior of the coagulated mass, and there is no need to dry the rubber—a fact that it is in accordance with Bamber's opinion, that rubber is better for a water content of 9 to 10 per cent.

Under Section 4 of the Madras Planters' Labour Act, 1903, H. E. the Governor of Madras has authorized Mr. Elsmere Hans Halliby, of Perren-godda Estate, Vayitri, to witness the execution of labour contracts.

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Coffee is grown in all the provinces of the Philippine Islands except in Bataan, Zambales and Ilocos Sur, on the western coast of Northern Luzon. In most parts of the country, however, it is only cultivated to a limited extent. The largest producing provinces are Cebu, with 29,468 lbs. in 1909, and Occidental Negros, with 22,317 lbs. In Batangas the production was 21,936 lbs. in 1909, as compared with 4,184 lbs. in the previous year. The total area on the Islands under coffee was 2,504 acres 1909, as compared with 2,003 acres in 1908, and the total production was 131,716 lbs. in 1909, as compared with 105,158 lbs. in the previous year.

Scientific Officer's Papers.**XXX.—SCALE INSECTS AFFECTING COFFEE ESTATES.***(Continued.)*

Remedies.—In dealing with remedies for scale insects, too much stress cannot be laid upon the importance of maintaining the strength and vigour of the plant attacked, and the beneficial part which is played by high cultivation.

In the report previously quoted in this article, and from which much of the information contained in it has been gathered, Mr. Lefroy, when dealing with this point, says :—

"A very great factor in the prevention and treatment of scale insects is the condition of the affected trees. There is a very close connection between the condition of a plant and its *immunity* from scale insect attack. There is a further connection between the condition of the plant and the extent to which it suffers if attacked. In the first case, a very vigorous plant may not be attacked at all ; it is apparently immune to that particular pest, where a weaker plant would be attacked. In the second a vigorous plant may not be able to resist the attack of a virulent pest, but does not suffer in the same way as a weaker plant would. Vigour is the vital thing and a plant growing in unsuitable circumstances is liable to insect attack."

"This principle must not be carried too far ; the practical application is simply that it is important to maintain the vigour of Coffee if scale insect attack is to be prevented or checked. Too heavy cropping may be followed by disease consequent on the weakened conditions of the plant. A bad season is often the precursor of disease if extra vigilance is not used in checking the *commencement* of the disease."

"The same applies to shade trees but in another way. Amongst the variety of trees used for shade it is as important to select those that *suit* the locality as those that give good shade and are good for the coffee. A tree growing in its natural place rarely gets scale insects and more rarely still *suffers* from them. A tree planted where it does not thrive may live and grow, but it is liable to scale insect disease and should there be the proper scale in that district it is a safe prophesy that the tree will suffer. I would most strongly urge the very great importance, in all cases of scale insects, of maintaining the vigour of the coffee, and of selecting only such shade trees as are likely to attain their full vigour."

Next to this come methods of spraying, or brushing, the trees with insecticides. How far this can be carried out must be left to the opinion of individual planters. Good results have been obtained, and are obtained, each year by adopting this method, and it is largely a matter of cost.

Many insecticides have been invented, but the following have been found the most effective, and can be recommended :—

(1) Mr. A. G. Nicholson's mixture :—

1 lb. Gossage's Blue Bar Soap	} In a kerosine tin of water.
1 lb. Crude Saltpetre	
1 lb. Rosin	

The affected parts of the trees are brushed over by hand with this mixture, a modification of which omits the Rosin and replaces the crude saltpetre by refined saltpetre. (See *Planters' Chronicle* Vol. V, pp. 33 & 41).

(2) Crude Oil Emulsion. This was invented at Pusa and is made in India, being obtainable at Rs. 6/8 per 5 gallon-drum. It is mixed with cold water in the proportion of 1-pint to a Kerosine tin (4 gallons), and it should

be applied with a spraying machine in the form of a fine mist. (See *Planters' Chronicle* Vol. V, p. 67).

(3) Various Insecticide Soaps are sold by the Vermisapon Specialties Co., at Coimbatore. One of these is Mr. Nicholson's mixture, and the others are now under trial.

Spraying machines, like sprays, are many. Mr. Lefroy has kindly supplied the following list as being the best obtainable in his opinion:—

(1) The Deming Success Knapsack Sprayer. This is obtainable from Messrs. MacDougal & Co., Oriental Buildings, Bombay, at Rs.50 each or 10 at Rs.48/- each, and is about the best all round machine on the market.

(2) Messrs. Williamson, Magor & Co., P. O. Box, 177, Calcutta, supply 20 Spr-motors at Rs.50 each.

(3) Gould's Knapsack Sprayers are obtainable from Messrs. Jessop & Co, Calcutta, at Rs.38 each.

(4) Vermorel Eclair sprayers can be got from Messrs. Oakes & Co., Ltd., Madras, at Rs.42. This firm are also the South India agents for Gould's.

There are of course many other spraying machines on the market, but Lefroy strongly recommends Deming's as the best, and from my own experience I quite agree with him.

In all cases of spraying it must be remembered that to be effective it must be *thoroughly* done. Careless spraying is useless. Every part of the plant infected with scales must be completely wetted with the insecticide. None of the insecticides mentioned above are strong enough, probably to kill all the eggs, and moreover, these are often protected from the spray by the shell of the scale; hence all spraying operations should be repeated at least once at an interval of a week or so. The second round of spraying kills the insects which have hatched out since the first round was done before they themselves can produce eggs.

Natural Enemies.

Nature keeps Scale Insects under control to a certain extent by providing that other insects, &c., should prey upon them. This is a universal law by which the balance of life on the earth is kept equal. The planter upsets this balance locally by cultivating a large number of plants, all of the same kind on a limited area, and by eliminating practically everything else. Scale Insects find a large amount of their food plants and favourable conditions of life on these areas, and consequently multiply much faster than their natural enemies, thus becoming a pest. With the increase of the scales, however, there is an increase of their natural enemies, for they too find plentiful food.

We have not yet learned how to make use of the natural enemies of scales to anything like a full extent. In isolated instances good results have been obtained, but attempts usually encounter many difficulties. Year by year however the agricultural entomologists are learning how to wield this powerful weapon with which Nature herself fights insect pests.

Many of the scales described above are known to have natural enemies in India. These are for the most part small, often microscopic, flies which lay their eggs in the scale; the larvae hatching from these eggs feed upon and destroy the scale. In addition to these flies other insects which feed upon scales are known, for instance some members of a family of Beetles, popularly known as Lady Birds, both in their larvae and adult stages eat young scale insects. In some cases also the larvae, or caterpillars, of certain small moths are known to feed on scales. The *Green*

Mealy Scale (Pulvinaria psidii) is attacked by the maggot of a small fly which feeds on the eggs, by the caterpillar of a small moth which spins a web over the egg masses and feeds on eggs and scale under its protection, and also by a black Lady Bird.

In addition to predaceous insects, scales, especially the Green Bug (*Leccanium viride*), are attacked during the monsoon by at least two kinds of fungi, or moulds, a white one and a black one. These fungi kill off large numbers of the scales, but unfortunately will only grow during the monsoon. Like all fungi they require moisture, and damp conditions, for rapid growth, and this is the great obstacle in the way of using them to control an attack by scales. During wet weather a certain amount can be done by pinning up branches and leaves containing scales attacked by the fungi in contact with scale infested branches. The fungi rapidly spread in wet weather and kill off large numbers of scales.

REFERENCES.

For further information on the subject of Scale Insects and their control, the following references to recent articles in the *Planters' Chronicle* should be consulted:—

Vol. IV.	p. 100	Sc. O. paper	I
	210	do.	III
	239	do.	V
	315	do.	X
Vol. V.	p. 7	Notes and Comments	Nos. 3 & 4
	pp. 33 & 44	do.	No. 7
	116	do.	No. 25
	67.		

RUDOLPH D. ANSTEAD, *Planting Expert.*

RUBBER BOXES.

In the *Tropical Agriculturist*, Dr. Willis notes that in a visit to the Rubber Works in Hanover, Dr. Prinzhorn pointed out the importance of having smooth clean boxes for rubber packing. In many of the rough boxes, when opened, it was found that there were chips of wood, sawdust and other debris left in the boxes and adhering to the rubber requiring to be removed by the washing machine.

This naturally deteriorates the value of the rubber, and can be avoided without any great difficulty.

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The following information is from the report by H. M. Consul at Batavia (Mr. J. W. Stewart) on the trade of Java in 1909:—

The expectation of greatly increased exports of tea during 1909, in view of the increased acreage coming into production, was not realised, owing to unfavourable weather, especially in the earlier months of the year. Shipments to all parts only totalled 36,679,000 lbs., as against 36,579,940 lbs. in 1908 and 29,286,400 lbs. in 1907. The quality of the product continues on the average to show improvement. The teas almost without exception show great care in preparation, and are brought to market in good condition. They are also very regular in quality. The results of the year's working have in general been very satisfactory, as throughout the year there has been a steady demand at good prices for the lower and medium sorts of tea, of which Java produces large quantities. During 1909 a considerable amount of clearing and planting of land belonging to old estates was effected, and many new companies were formed, in which British capital was largely invested.

Notes and Comments by the Scientific Officer.

43. *Pink Fungus and Bordeaux Mixture*.—In connection with what has been written recently in the *Planters' Chronicle* on this subject, the following questions have been asked by a correspondent :—

(1) If Bordeaux Mixture kills fungus instantaneously, or if it takes some days, and several applications, to do so ?

The death of the fungus is not instantaneous, but in the case of growing fungus is rapid. In the case of fungus spores, probably the mixture does not kill them at all, but when they germinate in its presence they are killed. Exactly how Bordeaux Mixture kills fungi is still open to question, and interesting information upon this point will be found in an extract printed in the *Planters' Chronicle* Vol. V, p. 229, where it is suggested that some copper actually enters the sap of the plant and its presence there kills the fungi. On the other hand it is suggested that perhaps the fungus dissolves copper by means of the substance it exudes to bore a way into the plant tissues, and thus absorbs it and is killed.

One application of Bordeaux Mixture properly applied should, I think, be enough. As already stated, the method is at present an experimental one as far as Pink disease is concerned, and these points will doubtless be solved as the experiment proceeds.

(2.) If tar should be applied on the same day as the Bordeaux Mixture ?

In some cases which have come under my notice, a patch of Pink disease has been cut out and tar applied, and yet the disease has started again at the edges of the wound. This is because all the spores have not been removed, or the cut was inoculated by spores on the knife. Hence it was suggested that the wound should be first washed with Bordeaux Mixture to deal with possible residuary spores, and then kept under observation till it was ascertained that the disease had really been removed, and after that the wound should be tarred. The time elapsing between the two applications would depend a great deal upon the climatic conditions at the time. If the tar is applied carefully to the wood only (See *Planters' Chronicle* Vol. V, pp. 65 & 71) while the Bordeaux is applied to the cut bark edges, the tar might be put on very soon after the Bordeaux,—say in a day or two.

(3.) If it is necessary to tar the forks of the trees after applying Bordeaux Mixture ?

This is not necessary. Tar need only be applied to cuts to prevent rot, and the entrance of fungi which live on dead wood, until the bark can heal up the wound.

44. *Sulphate of Copper*.—When writing on the subject of 'Pink Disease of Pará Rubber and Bordeaux Mixture' it was mentioned (*P. C.* Vol. V, p. 212) that Messrs. Peirce, Leslie & Co., Ltd., stocked Sulphate of Copper at Cochin only. They now write me as follows:—"We are now making arrangements to stock Sulphate of Copper in Calicut as well as Cochin. What we are going to import is Sulphate of Copper, Soluble Brand, Guaranteed 99% pure, in very fine granular form packed in strong bags of 100 lbs. each. We do not anticipate our quotation for this, on arrival will be more than Rs.30 per cwt. Our suppliers inform us that the bags are very strong, but we think it doubtful whether they will carry the stuff satisfactorily up-country, and we think the original package we proposed, *viz.*, Kerosine tins, will be more satisfactory." There should now be no difficulty about obtaining sulphate of copper in a suitable form to make Bordeaux Mixture.

RUDOLPH. D. ANSTEAD, *Planting Expert*.

SELECTED CUTTINGS.**Coffea Robusta.**

The following interesting notes on *Coffea robusta* are taken from Bulletin No. 7 of the Department of Agriculture of the Federated Malay States, by W. J. Gallagher, M.A., Director of Agriculture, F. M. S. :—

Coffea robusta was discovered wild in the Congo by Emil Laurent in 1898. The plant was taken up commercially by a Brussels horticultural firm and named *Coffea robusta* by them. A few plants were brought in Wardian cases to Java 1900, where in 1905 it first began to be planted to some extent, and in considerable quantity in 1908 and 1909. Except in the Experiment Station at Kuala Lumpur, where it has in bearing for some time, it was not planted in the F. M. S. until about a year ago, when small areas were put down in the Klang and Jugra districts, and mainly as a catch-crop in rubber.

Coffea robusta and Coffea liberica.

Robusta differs in many ways from the well-known *Liberica*. The habit is somewhat different. *Robusta* grows more rapidly. An eight-months old *Robusta* plant is much larger and has more branches and leaves than a year old *Liberica*. The branches of *Robusta* are longer and have a tendency to bend down towards the ground so that the bush is rather umbrella-shaped. Gourmandisers and suckers are fewer than on *Liberica*; the leaves are a lighter green, thinner, and larger in size.

Robusta bears more berries in a cluster than *Liberica*, often over sixty; they are much smaller, but the beans are almost as large, the skin is thinner. On an average 10 pikuls of Liberian berry give 1 pikul of market coffee. On the other hand only 4 pikuls of *Robusta* berry are required for a pikul of market coffee. Though many more berries go to a pikul than in *Liberica* the greater number in a bunch makes the picking if anything cheaper.

Productivity of Robusta.

Plants about eight months old begin to show flower buds, but a number of these early flowers may not develop into berries, and no concern need be felt if they do not, as, unlike *Liberica*, all later flowers set.

The plant blossoms the whole year through and no loss will occur from "windfall" if berries are collected once a month.

About ten months are required for the berries to come to maturity; when most of them in a cluster are straw-coloured they may be picked; as a rule the whole cluster may be gathered. A small crop can be collected in the second year, and in the fourth year practically the maximum crop is obtained. From that time onwards the yield is fairly uniform. The following figures give the production on an estate in Java planted 10ft. by 10 ft., with forty-five nutmegs taking the place of coffee, that is 390 plants to the acre—

2nd year	...	1 pikul (nearly) per acre.
3rd year	...	6 pikuls per acre.
4th year	...	14 pikuls per acre.
5th year	...	14 pikuls per acre.

In Java it was at first urged against *Robusta* that its fecundity would not continue, but it is now seen that nine-year old plants are as vigorous and yielding as much (and more) as they did when they were four years old.

Soil Suited for Robusta.

The root development of *Robusta* is comparatively rapid and intense. If a young *Robusta* plant is pulled up it will be found to have a mat of fine

rootlets—considerably more than a Liberian plant of the same size would show. It is easily understood then that it thrives best in a loose clay soil, somewhat sandy for preference. Practically all our inland estates have soils which are admirably adapted to it.

In peat land experience here has already shown that it does not thrive, at least where the peat is deep and badly drained. It behaves just as rubber and other plants do when they suffer from acidity in the soil; except that Robusta is more sensitive than the Pará tree. The acidity of such soils must be removed by good drainage and a liberal application of lime. The quantity of lime required will vary with the acidity, which must be tested from time to time. It is now proven that by such treatment Pará can be made to thrive, and no doubt Robusta would too. *Coffea camphora*, which is equally prolific, would probably do better in such land.

Nursery.

This should be made on virgin jungle soil and level land. It should not be made among rubber of more than a year old. The leaves of nursery plants grown in the shade of rubber-trees become white, and the growth is poor.

The beds should be about 4 ft. wide with a furrow of 2 ft. between. The seeds should be just covered with fine mould and may be put in 6 to 10 in. apart according to the length of time the young plants are to be kept before transplanting. The shade should be about 6 ft. high, and gradually removed until the plants are fully exposed when they have four pairs of leaves. This is a suitable stage for planting out.

A kati is about 2,000 seeds.

Distance of Plants Apart.

If put down as a permanent cultivation of coffee only, the best distance is 12 ft. by 12 ft. with an additional plant in quincunx, which gives 600 to the acre.

As a catch-crop among rubber it should be in bands between the rows of trees, planted for preference in the avenue style. The plants should be 6 or 7 ft. from the rubber rows and 5 ft. from each other. Thus in a field planted 28 ft. by 14 ft. or 30 ft. by 15 ft. four rows of coffee can be planted in the wider avenue; this will give about 1,150 plants in the former and 900 in the latter to the acre. Interplanted among cocoanuts which are 30 ft. by 30 ft., the coffee should be 7 ft. apart and 8 ft. from the cocoanuts, as it will be kept longer than among rubber. Three rows can be put in, and in such way along both lines that the cocoanut-tree stands in a square of coffee 8 ft. inside.

Planting Out.

Seed at stake, young plants, or year-old stumps may be used. A stump, since it has a certain amount of reserve in it, will probably beat seed at stake put down at the same time, and for this reason is to be preferred. Stumps are not available in the F. M. S. and the planter should put in young plants with four or five pairs of leaves, or, failing that, seed at stake, in which case it is probably safer to germinate the seeds first, but they should be put out as soon as the shoot shows, and great care taken to see that it is not broken.

The usual enemies of rubber-seed at stake will of course attack coffee put out in the field as seed. The seeds should be covered very slightly, and well shaded by palm leaves or ferns. If ferns are put in green they will curl up and become useless.

Seed at stake is undesirable in hilly land, as much of it is liable to be swept out of place or covered up so deep in detritus that it is unable to send its young shoots above ground. Putting out young plants is in every respect much safer and better. If the planter has to start with seeds he will lose nothing in growth or otherwise by starting them in a nursery. When transplanting the lateral roots may be trimmed or left alone, but the soil must be pressed fairly firmly round the root. When it is loose it cannot retain moisture, and the young plants fail, if a drought comes on after planting out.

Weeding.

Robusta must be kept absolutely clean-weeded. Hand weeding is best. Where the chungkol is used, the cooly is apt to wound the lower part of the stem, which encourages the growth of unnecessary branches; these take away nourishment required elsewhere, and, if they appear, they should be cut off as soon as possible. A good digging or forking over the ground in the end of the second year would likely be beneficial. It should certainly be done in the third.

Pruning.

The plant tends to form only primary branches. It should be topped at a height of 8 ft., to give a thicker branching by forcing out secondary branches, which bear as well as the primaries. Less pruning is required than with Liberica, but it must be commenced earlier. Young shoots, due to injuries suffered during weeding, arise near the ground on plants of six months and older and must be cut off early. As a catch-crop most of the crop is to be collected in a few years, therefore the drastic prunings taking away half the foliage of the tree, which are now administered to interplanted Liberica every nine months or more, must be avoided. Pruning should be done with a sharp knife, and not by plucking.

Preparation for the Market.

Except on a couple of estates all the coffee at present grown in the F. M. S. is sold in the berry to Chinese. The individual Chinese purchaser, or often two or three working together, prepares by hand machines all he buys. The European rubber planter who looks upon his Liberica as of little consequence finds it pays him better to sell the collected berries than to run his old coffee machinery for such small quantities as he can gather at irregular intervals. Where relatively large areas are under Robusta it will no doubt be found most profitable to put down sufficient plant to treat the berries on the estate. It is desirable from another point of view that the product should not be done in the rough way the Chinese follow. The present output of coffee here is probably all consumed locally. . . .

The berry is much smaller than that of Liberica, and the pulper used for the latter will be found to be unsuitable. A small Lidgerwood pulper is the best. Hr. van Lennep states in a recent number of the "Culturgids" that the beans must be fermented for thirty-six hours after pulping, and after being well washed, turned wet into the drying house to dry as quickly as possible at a high temperature. The Guardiola dryer is especially suitable. While in the drying-house the coffee must be often moved, so as to get a regular drying. Coffee so prepared and dried keeps its bluish colour long and has a good flavour.

Robusta in the Market.

Reports from the home market show that it must be heated and ground in a manner somewhat different from other coffees, and that as to quality

experts are inclined to put it nearly on a level with best Santos. "At present the price is about 25 dollars a pikul," but this will hardly be maintained. There are now upwards of 15,000 acres under Robusta in the Dutch Indies, mainly in Java, and it is probable that the price may fall to 17 dollars or 18 dollars about £33—£34 per ton.

Pests of Robusta.

Robusta has up to the present shown itself free from parasites, but it can hardly be expected to remain so. Grown side by side with Liberica at Kuala Lumpur it is almost, but not quite, free from leaf disease.

As regards insect pests it is probably as liable as Liberica, if not more so, to their attacks.

Robusta as a catch-crop in Pará Rubber and Cooanuts.

Many of our soils, especially on hard-backed steep hills, are not over fertile, and it is probable that it is the best in the long run to bring rubber into bearing without catch-crops, which all compete with the principal and remove a certain amount of available plant food. But many private owners, small syndicates, and even companies cannot wait five years for a return. A desirable catch-crop should be a crop yielding a good profit; it should not be too severe on the soil; it should bear early; it should admit of weeding so as to leave the land in a clean condition when it is taken out.

Tapioca has been tried and is hardly a success. In fact it is quite undesirable. Apart from the possibility at present prices of its yielding a very small profit, if any, it is so difficult to weed that a large amount of lalang gets in and the land is in a decidedly dirty condition when the crop is removed. Camphor allows the land to be kept clean, but the time to wait for a crop is too long and then the profit is not much. *Coffea robusta* offers by far the best catch-crop. A small return will come in the second year and a good one in third and following years.

Therefore for those who must put down a catch-crop it is undoubtedly the best. The production of Robusta costs less per pikul than Liberica. The total cost of production should not exceed 12 dollars a pikul, which returns a profit of 6 dollars a pikul on an average price of 18 dollars a pikul. Planted as a catch-crop in the way already recommended, *i.e.*, about 1,000 to the acre, a return of 10 pikuls of market coffee ought to be obtained by the end of the fifth year. This would yield a profit of 60 dollars or over 130 dollars at present prices.

These figures are conservative, judging by the example already given from Java. In the F. M. S. we have not sufficient data on which to base close estimates; but is evident that if the entire capital cost of the rubber cannot be recovered, at least from the end of the second year it can be more than upkept from the profits of Robusta.

It must be remembered that the cost of planting the Coffee has to be added to the cost of bringing the rubber into bearing but on the other hand owing to the earlier shade the weeding will cost less than in Pará alone.

When rubber has been interplanted in Liberica it is a common fault to let the coffee practically die out. This should be guarded against when the time comes to deal with Robusta. Large Robusta of five years old will compete seriously with Pará. The Robusta should be ruthlessly cut out as soon as the branches of the rubber trees meet, and certainly in the beginning of the sixth year.

The dollar in Malaya is worth 2s. 4d. The pikul=133½ lb.

Wilt Disease of Pepper.

(SUMMARISED BY T. PETCH.)

The wilt disease of pepper first began to attract attention in Southern India about ten years ago. During the next four or five years it caused considerable loss both on European and native plantations, and consequently was the subject of investigation, first by Barber and afterwards by Butler. According to Butler's report, "over four thousand acres of pepper cultivation are in the hands of Europeans in South Wynaad, and perhaps five times as many are grown by natives. A far greater amount is grown on the coast districts of Malabar, but it is impossible to estimate how much this may be." By 1904 some estates had already lost the greater part of their plants, and others were affected more or less severely. About the same time, a disease with the same symptoms was discovered in Java, where it was investigated by Zimmermann and Breda de Haan.

This disease was discovered in Ceylon in 1906, and was recorded in the Report of the Mycologist for that year. Since then, specimens have been received from time to time, but no widespread damage has been recorded. Pepper in Ceylon, although a paying crop in some districts, is only a subsidiary one, and there are no extensive areas under pepper cultivation only. It is usually grown among cacao or tea, and under these circumstances it is probable that the spread of the disease is restricted. There are small blocks of pepper alone on some estates, and these suffer more from the disease than the vines scattered through caca.

The symptoms are described by Butler as follows:—"In a healthy full-grown vine the trunk of the standard is entirely hidden in a mass of foliage. This arises from a number of climbing stems which closely embrace the standard and secure themselves to it by numerous tufts of aerial lateral roots. When such a vine becomes diseased, the first symptom noticed is an appearance which was described to be as a "staring" look about the vine. This is due to a loss of rigidity in the leaves and leaf stalks, resulting in their drooping. With the collapse of the leaves the dense covering of foliage becomes diminished, and the stalks of the vine and patches of the trunk of the standard come into view. The next noticeable thing is that a portion of the climbing stems fall away from the standard, as a result of the death of the clinging roots and consequent relaxation of their grip. Soon the leaves begin to turn yellow, and numbers of them are shed. Later all the vine withers, and the standard remains lightly festooned with relaxed stalks bearing a few dried leaves. While the upper part of the vine makes no attempt at recovery, the lower part often retains sufficient vitality to form new leaves, or even to throw out fresh shoots. But these in turn succumb, and I have not come across any case of recovery once the leaf-dropping has commenced."

The cause of the disease has not yet been fully determined. In Java, it was attributed to the common eel worm, *Heterodera radicola*, which was not however thought to kill the vines directly, but to weaken the root system and cause galls through which other organisms could enter the plant. This eel-worm is quite common, and it is not surprising that it should occur in the mounds which are built up round the base of the vine in Southern India. But it is not invariably found associated with dead and dying vines, and therefore it cannot be regarded as the cause of the disease in all cases, if in any. If the disease were caused by eel worms, the injection of carbon disulphide into the soil would probably be an effective remedy.

When the vine is dead, the minute red fructifications of a *Nectria* may sometimes be found on the bark. Butler found *Nectria* in large

numbers on dead vines in the Wynaad, but as no description has been published, it is doubtful whether the Indian form is identical with that found in Ceylon. A mycellium, presumably that of the *Nectria* referred to, is found in the vessels of dying vines. Butler regards this *Nectria* as the cause of the disease, death resulting from the obstruction of the water supply by the mycellium in the vessels and the gum-formation which its presence induces.

An experimental pepper farm has been opened in Malabar for the study of different varieties of pepper and for the investigation of this disease. It is hoped to obtain resistant varieties, but as the plant is a slow growing perennial, results cannot be expected for a long time.

Investigations have recently been begun by Messrs. Macrae and Anstead, and in a preliminary paper in the *Planters' Chronicle*, the latter recommends the adoption of the following measures, pending the results of experiments which are now being instituted.

"In the first place pepper cultivations should be well drained so as to keep the bases of the vines free from stagnant water. A system of drains, 18 inches deep, will probably be found beneficial.

"As a preventative, every vine, healthy or diseased, should be sprayed at least once a year with Bordeaux mixture. The bottom three or four feet of the stem should be well drenched with the mixture. This will require about a quart of the mixture for each vine, and it may be applied with a watering can, though it will be found more economical and rapid to spray it on with a Deming Success Knapsack sprayer fitted with a Bordeaux mixture nozzle.

"As soon as ever a vine begins to show signs of the disease, the area covered by the roots should be given an application of slaked lime, at the rate of about 4 lbs. per vine, broadcasted on the surface, and a trench should be dug round it to a depth of about 12 feet, the soil taken from the trench being thrown inside to cover the lime.

"Care should be taken about forking round the vines; if done at all it must be done very lightly so as not to wound the roots and form points of entry for fungus spores. Cattle manure should be applied as a mulch, and covered down with leaves, &c. At the Tallparamba farm leaf mould is found to be a good fertiliser for pepper. At all times the vines should be kept heavily mulched, and if this is done no forking will be necessary beyond perhaps breaking up the area just beyond the root spread every year, *i.e.*, forking a circle round the vine outside the range of the roots."

"More care might be taken, I think, with advantage to keep the fields clean. I have already alluded to the importance of destroying dead vines; all diseased plants should be cleaned up and burnt. On one occasion part of a dead vine covered with fungus fructifications was picked up by the roadside, it having evidently been used to tie up a bundle of wood. This serves to show how careful one should be to keep the totes clean, and how easy it is to spread the disease about."

Mr. Macrae states: "I have been assured that after a diseased stem and the upper parts of the roots to a depth of about one foot have been removed, new cuttings may be planted immediately, and that the percentage of these cuttings that strike is not less than that in places which had not previously supported diseased vines. I was shown such that were five years old and still look healthy. But the reverse is the case in some other instances."

It would seem preferable to leave the ground vacant, after forking in lime, for about a year.—*Tropical Agriculturist*.

The Planters' Chronicle.

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THE U. P. A. S. I.

(INCORPORATED.)

The Late King-Emperor.

A letter, dated 31st May 1910, from the Chief Secretary to the Government of Madras, Public Department, to the Secretary, U. P. A. S. I., reads as follows :—

“I am directed to acknowledge the receipt of your telegram, dated the 16th May 1910, and to express the thanks of His Excellency the Governor in Council for the expression of sympathy and condolence which you have been good enough to convey on behalf of your Association upon the occasion of the lamented death of His late Majesty the King-Emperor. Your message will be transmitted to the proper quarter.”

The P. B. F.

Towards the score of Life Members wanted to give effect to the Hon'ble Mr. J. G. Hamilton's proposal, five may be said to have been secured. Mr. J. A. Richardson has subscribed on behalf of Paloor Estate; another gentleman is understood to have done the same on account of his estate, though official intimation of this has not been sent in; and Mr. Bernard Malcolm has asked to be admitted as a participator in the scheme suggested by Mr. Hamilton.

Fifteen more names are required.

The fund has received a very welcome “windfall” in the form of a donation, through the North Mysore Planters' Association, of Rs.+39, the balance left over of a small fund raised for the widow of a planter in the North Mysore district.

Tephrosia purpurea.

A *Selected cutting* in this number forcibly points out the advantages of a plant known botanically as *Tephrosia purpurea* for a green dressing and cover crop. This is of special interest to planters in South India because this plant is a common one in the district. It has been mentioned several times lately in the *Planters' Chronicle* (Vol. IV, pp. 236, and 238, Vol. V, pp. 29, 152, 213 and 221). Mr. Graham Anderson gives the Canarese name as *Oogin gidda*, and it is also known as *Kolingi* and *Vempali*. It grows in large quantities on the open maidan country between Hassan and Arsikere, where there must be many square miles of it, so that there should be no difficulty whatever about obtaining seed.

In the Federated Malay States it is said to grow to a height of 9 to 11 feet, but in Selangor it is reported as only reaching a height of 15 to 30 inches, and that is about the height it reaches in the Hassan District. This is a very suitable height for Tea and Coffee, so that in India it would appear to be a more suitable plant for a green dressing than it is in the Malay States.

Some time ago it was mentioned in the *Planters' Chronicle* (Vol. V, p. 15) that the Secretary of the U. P. A. S. I. had seeds of various leguminous plants, likely to prove useful as cover crops, planted in his garden. *Tephrosia purpurea* was one of these, and it has made there a growth of about 2 feet high and produced a good crop of seed, in fact it has seeded with exceptional freedom. Only a very small plot was grown, so that there is not enough seed available for general distribution, and it will probably be used to establish a larger experimental plot of the plant under estate conditions if the Scientific Officer can arrange the matter.

The other seeds sown in this little experimental plot were :—

Crotalaria striata from Ceylon.

Desmodium ovalifolium.

Clitoria cajanafolia.

Of these the *Crotalaria* grew strongly and well, but it needs little comment as it is a well known plant now, and in some districts extensively grown among rubber. A few plants of *Clitoria* have been raised and are now in flower, but the *Desmodium* failed to germinate.

Sprayers and Insecticides.

Messrs. Oakes & Co. Ltd., Madras, have kindly sent up three sprayers, of different makes, for trial by the Scientific Officer in the interests of the planting community. The three makes are :—

Gould's

Vermorel Eclair

Four Oakes,

and it is hoped that the results of the trials will be available shortly.

The Vermisapon Specialties Co., Coimbatore, have supplied samples of Insecticides for similar trial. Some of these are being tested, at the request of the Scientific Officer, on different estates. With others he will conduct a few spraying operations himself, combining a test of the insecticides with a test of the Sprayers already mentioned. The "Green Bug" cannot be among the scales to be attacked in this way in Bangalore; but other scale insects are on the spot and will at least serve to enable the sprayers to be tried in a thoroughly practical way.

One Way!

"The franking privilege has been invoked to revive the languishing coffee industry of Porto Rico. If plans devised and favored by high officials of the War Department are carried out there will be inserted in the Post Office Appropriation Bill now before the Senate Committee on post offices and post roads a paragraph providing for the free transmission through the mails of packages of Porto Rican coffee, up to two pounds in weight, for a period of six months."

There is no help of that kind for the planter in India!

Scientific Officer's Papers.**XXXI.—RUBBER SUBSTITUTES.**

Rubber planters are naturally very interested in the possibility of rubber, or some substitute for it, being manufactured more cheaply than it can be produced on the plantations.

There is behind the present brilliant prospects for rubber planting the haunting dread of a cheap artificial product being discovered, and the possibility that this comparatively new planting industry may meet with a similar fate to that of Indigo, Madder, and to a lesser degree Sugar, in the past.

This possibility seems at the present time to be remote to a most comforting degree, and the following extracts from an article on "Substitutes for Rubber" by Mr. C. Simmonds which appeared in "Nature" for 17th March will doubtless prove of interest.

The article in question begins by stating that the substitutes in actual use at present are of three kinds, viz :—

- (1) rubber substitutes proper, consisting wholly of ingredients other than rubber.
- (2) composite, or "artificial" rubbers, which contain a certain proportion of natural rubber worked up with other substances.
- (3) true synthetic rubber, namely, a product containing the rubber molecule synthesised in the laboratory, or factory, by chemical means from simpler compounds.

"At present the first of these classes is commercially the most important. Scores of recipes are in existence, including very diverse ingredients; but the basis of most is a modified oil."

The third class, however, is the one to be really feared, and is the 'artificial' rubber, as that term is often used, though it should more correctly be called 'synthetic rubber'. It is this that the chemists are striving to produce, as they produced synthetic indigo, and it is here that the danger to rubber planters lies, if danger there be. Mr. Simmonds goes on to say :—

"In what sense are the foregoing articles and their likes to be considered as 'substitutes' for rubber? Some persons are disposed to deny them any right to the title, and would look upon them as mere adulterants whenever used partially to replace rubber in what would otherwise be an all-rubber article. Others admit, though sometimes grudgingly, that there is a place which such substitutes can usefully fill. Much depends on what the article is sold as, and on what use it is to be put to. Not all the special qualities of rubber are wanted in all the products for which it is employed. A door-mat is one thing, a bicycle tyre quite another. Where a high degree of elasticity is not really needed, as, for instance, in waterproof goods and electrical insulating work, there is a legitimate field for substitutes which may serve the required purpose. Even here they may not be equal to rubber, but they find their justification in their lower cost. After all, we do not need razors to cut sticks with."

"It may be said at once that no substitute is equal to rubber in every respect. Chemically, the latter is a very inert substance—much more so than the substitutes. Hence, even if the latter were not otherwise inferior, they would be less durable than rubber under certain conditions. They are nearly all acted upon more or less readily in circumstances where rubber remains unharmed. The modified oils, in fact, are still oils in the sense that they remain glycerids, decomposable by alkalis, as also by steam under pressure. If used for articles exposed to these agencies, they fail in durability, whatever their excellences otherwise."

"The fact that substitutes of this class are readily saponifiable by alkali makes it an easy matter to detect them by analysis when compounded with true rubber. As a rule, the proportion of substitute used is from 5 to 25 per cent., and even the smaller quantity is recognisable.

"Of the composite rubbers (or 'artificial rubbers,' as they are sometimes called), one preparation which has been made in quantity, and is said to be excellent for many purposes, has for its basis Guayule rubber incorporated with certain gums. Another such article is compounded of natural rubber and some other substance of vegetable origin, probably a latex or a gum, reputed to contain the same chemical elements as rubber and in much the same proportion. Such articles are, of course, only partially 'substitutes' for rubber, and their cost rises with that of the latter ingredient. Moreover, if any very large demand for them arose, there is always the possibility that the supply of gums and latices would become insufficient, and the advantage of lower cost would thus tend to disappear.

"Coming now to true synthetic rubber; a question often asked is whether there exists any probability of such an article being manufactured and displacing natural rubber, either wholly or to any large extent. Will rubber plantations go the way of madder fields and indigo cultivation? Well, the future is on the knees of the gods. In the face of the precedents just mentioned, to say nothing of others, he would be a bold man who would venture to say that even the best quality of rubber may not some day be made on a commercial scale from cheaper materials such as beet sugar and calcium carbide. But the day is not yet. There are beginnings; there are clear indications of the direction in which to proceed; there is distinct progress to note. But there is still some distance to go, and the end of the journey may not be even in sight.

"India-rubber chemically is essentially a polymerised terpene. An article patented some time ago, and named 'turpentine rubber,' appears to foreshadow a synthesis of true rubber. Turpentine is a mixture of terpenes, and the article in question was to be obtained by passing turpentine through a hot tube, and treating the resulting vapours with hydrochloric acid. The result is a solid condensation-product; and the idea at the base of the process appears to be the production of polymerised terpenes having some of the elastic properties of rubber.

"A more promising, because a more scientific way, is that outlined in Heinemann's patent No. 21,772 of 1907.

"The raw materials, so to speak, are acetylene, ethylene, and methyl chloride, which are themselves obtained by any of the ordinary methods, *e. g.* from calcium carbide, alcohol, and beet sugar residues respectively.

"The question is, can this or some other comparatively simple synthesis, theoretically quite possible as a laboratory operation, be translated into a practicable and profitable mode of manufacture on a large scale? One of the first doubts to arise is whether the synthesised caoutchouc will have the physical properties of natural rubber; or whether these, by any course of treatment, can be imparted to it. This doubt resolved, there comes the question of economical production in competition with the natural product. Much time and thought have been spent on the problem of synthetic rubber, and it is safe to conclude that there will yet be many a headache before it is solved. Judging by what is known to have been done rather than by the promises, owners of rubber plantations may for the present sleep peacefully in their beds."

RUDOLPH D. ANSTEAD,

Planting Expert,

Notes and Comments by the Scientific Officer.

45. *Rubber Tapping Systems*.—A correspondent asks if daily tapping is likely to harm Pará trees. He says:—"I am tapping with satisfactory results daily instead of, as on most estates, every second day. Latex flows much more freely on Saturdays after a week of steady tapping than on Mondays after the Sunday rest. I shall rest my trees during June, July, and part of August."

Whether it is better to tap daily or on alternate days depends probably a great deal on the nature of the land, and must be determined for each estate. Some valuable information bearing on this point appears in the *Planters' Chronicle*, Vol. V, p. 215, in an account of the Rubber Planters' Conference recently held in the Federated Malay States. At this Conference it was agreed that the majority of planters favoured tapping on alternate days. The Superintendent of Experimental Plantations and others said that they found that tapping on alternate days gave the best results at first, and after that daily tapping. On the other hand exactly the opposite results were obtained by other men.

If my correspondent finds on his estate that it is better to tap daily I advise him to continue this system regardless of what may be done on neighbouring estates, where probably alternate day tapping has been found to give the best results, since that system is adopted.

46. *Grafting and Budding Tape*.—An enquiry has been made for a good recipe for a budding and grafting tape. Many recipes are published, but I would recommend the following given in the Bulletin of the Department of Agriculture, Bahama :—

"The best material for making grafting or budding tape is cheap cotton cloth which will tear easily. Rip up the cloth in strips of desired widths, say 6 or 7 inches, and roll these lightly on a stout iron wire as long as the width of the cotton strips. Several strips may be rolled on until the roll is 1 inch in diameter; tie a string round the roll at each end to prevent unrolling while being boiled in the wax.

"A good wax is made by boiling together 2 lbs. of beeswax, 2 lbs. of rosin, and $\frac{1}{2}$ lb. of good lard; when the mixture is boiling, put in the rolls of cloth and let them remain for 15 minutes; take them out, and allow to cool before putting away. The iron wire is more desirable than sticks of wood, as the weight of the wire keeps the roll below the surface of the boiling mass. Another advantage in using the wire is, that if the wooden sticks are not quite dry, the water as it is converted to steam will cause the contents to boil over."

47. *Crude Oil Emulsion*.—A correspondent in the Shevaroyes expresses the opinion that, "it would be a great benefit to planters" if I would inform them where Crude Oil Emulsion is obtainable, or better still how to make it on the estate.

It cannot be made on the estate; machinery is needed, and the secret of getting a good emulsion containing enough oil to be effective is known only to the manufacturers.

The only place it can be obtained at present is Calcutta, where it is sold by Bathgate and Co., Old Court House St., at Rs.6/8 per 5 gallon drum.

RUDOLPH D. ANSTEAD,
Planting Expert.

DISTRICT PLANTERS' ASSOCIATIONS.

Wynaad Planters' Association.

Proceedings of a Meeting held at Meppadi Club on June 8th, 1910.

PRESENT :—Messrs. Behr, Trollope, Powell, West; Visitor: Mr. Hammond; and C. E. Abbott, Honorary Secretary. Mr. Behr in the Chair.

1577. The Meeting passed a resolution expressing its deep regret at the loss the Empire had sustained by the death of King Edward VII.

1578. *The Proceedings of last Meeting* were confirmed. Mr. Anstead has written to thank the Association for electing him an Honorary Member.

1579. *Green Tea Bonus*.—Read correspondence. This Association has already passed a resolution in favour of the bonus being renewed, and thanks the Central Travancore Association for its support.

1580. *Poodapardy Telegraph and Post Office*.—Read correspondence as to making this a combined Telegraph and Post Office, and subsequent correspondence with the Post-Master-General, who ordered the Post Office to be closed at end of March.

Note.—Since the Meeting the Honorary Secretary has interviewed Mr. Ricketts, Superintendent of Post Offices, who has promised to allow a special bag to be made up at Vayitri and Tamracherri Post Offices to be dropped at Poodapardy.

The reopening of the Post Office depends on the possibility of getting a suitable man for the work with Rs.300 security.

This will be discussed at the next Meeting, July.

1581. *Experiments with Pepper*.—Read correspondence. Honorary Secretary to enquire if these experiments can be carried out with a smaller number of Vines.

1582. *Sale of low grade teas*.—It was resolved to reprint the following paragraph from the proceedings of this Association dated Oct. 14th, 1908. "The promise made at the Meeting was, that, for the present no member will sell any tea or refuse at a lower price than 2½ as. per lb. at the factory door, without giving notice to the Association."

1583. *Non-Service of Warrants*.—Mr. West produced a list of 10 warrants taken out by him this year which have not been served. In one case in which a warrant was taken out on April 18th, Mr. West stated that the accused is living at Chaliote Village, near Sultan's Battery, and the warrant is still with the Police, though the Magistrate instructed the Police to apply to Mr. West to have the man pointed out. This they have not done.

Honorary Secretary to write to the District Superintendent of Police calling his attention to this case, and specially noting that, writing on May 7th, the Magistrate says, "the warrant is still with the police."

1584. *Purchase of Cinchona Bark by Government*.—Read letters (U.P.A.S.I. circulars) from Hon'ble Mr. J. G. Hamilton and Mr. Hodgson.

Read Honorary Secretary's letter dated May 7th, which was approved. This Association will do all in its power to support the Nilgiri and Anamalai Associations in their efforts to secure fair terms.

1585. *Planters' Benevolent Fund*.—Read correspondence. The Honorary Secretary called attention to his circular issued after last Meeting.

The subscription for a Life Member is Rs.200, and the Annual Subscription Rs.10. Those who intend to subscribe are requested to inform the Honorary Secretary before June 25th.

1586. *Insecticides*.—Attention is called to Mr. Maxwell Lefroy's letter strongly recommending Vermisapon.

1587. *Attesting Contracts*.—Mr. Howland and Mr. Hallibey have been appointed under the Act to attest contracts.

1588. *Standardising Weights*.—Read letter from Mr. Richards, I.C.S., Collector of Bangalore, urging the adoption of the English pound as the standard. This was approved.

1589. *Scientific Officer's Laboratory*.—Read correspondence. Recorded.

1590. *Scientific Officer's Fund*.—The Honorary Secretary has paid the Association's subscription up to April 15th. Read letter from Secretary, U. P. A. S. I., explaining the position, stating that a further payment is due to Government.

Resolved, that the Honorary Secretary ask that subscriptions be paid for the year ending April 15th, 1911. It is hoped that members will pay this at as early a date as possible.

1591. *Attesting Coolies Contracts in Mysore*.—Read letter from Mr. Wapshare asking us to support the resolution he carried at the Meeting of the Nilgiri Association asking for more officials to be appointed for this purpose. Agreed.

1592. *U. P. A. S. I. Annual Meeting*.—The date has been fixed for August 1st, which those present considered inconveniently early for tea planters. Mr. Abbott was elected as delegate to represent the Association. Mr. A. H. Mead was also elected as delegate. The Honorary Secretary stated that the subscription due to the U. P. A. S. I. has been paid in full for the current year.

A vote of thanks to the Chair terminated the proceedings.

(Signed) B. M. BEHR,
Chairman.

(Signed) C. E. ABBOTT,
Honorary Secretary.

North Mysore Planters' Association.

Proceedings of Quarterly General Meeting held at Balchounmur on June 6th, 1910.

PRESENT.—Messrs. C. P. Reed, (President), C. Danvers, L. P. Kent, E. C. Kent, R. G. Foster, F. W. Hight, S. H. Dennis, E. W. Fowke and A. F. Evetts, (Hon. Secretary). By Proxy: Mr. D. Mathias. Visitors: Messrs. F. Morgan and E. K. Foster.

Before beginning the business of the day, the President thought it was the duty of this Association to put on record its feeling of profound sorrow at the lamented death of one of the most illustrious sovereigns of modern times, our Most Gracious Majesty King Edward VII.

The entire meeting respectfully endorsed what the President had said.

Recorded :—"That this Association feels deeply the very great loss we, the Empire, and the World, have sustained by the death of our beloved sovereign King Edward VII; its deepest sympathy with Her Most Gracious Majesty Queen Alexandra in her great affliction, and its sincere condolence with the Royal Family in their dire bereavement."

Scientific Officer Fund.—Read letter from the Secretary dated 22nd April and circular No. 26/10 with regard to the supplementary subscription.

Resolved :—"That the Hon. Secretary do pay the supplementary subscription referred to in the above circular."

Scientific Officer Laboratory.—Read Circulars Nos. 16, 17, 18 and 23 of 1910.

Resolved ;—"That this Association considers a laboratory is indispensable for the use of the Scientific Officer, and is prepared to subscribe its share to the cost of renting apartments and the equipment of the proposed laboratory to the extent of Rs.500; but at the same time it is hoped the U. P. A. S. I. can induce the Madras, or Mysore Governments, to provide Mr. Anstead with the necessary accommodation and equipment."

Benevolent Fund.—Read circulars Nos. 21/10 & 25/10 re: the Hon'ble J. G. Hamilton's offer. The following have added their names to the list of annual subscribers of Rs.10 each:—Messrs. C. Courpalais, H. Pilkington, N. G. B. Kirwan, F. J. Parton, H. M. Northey, A. Durham and S. L. Mathias.

Coffee Cess.—Read circulars Nos. 100/09 and 4/10.

Resolved :—"That the Honorary Secretary do write to the Honorary Secretary, North Mysore Native Planters' Association and enquire as to what steps, if any, have been taken to gauge the opinion of the native planters in the matter of the proposed Coffee Cess and to request him to kindly do his best to impress upon the members of his Association and others the utility of the proposed cess."

"That post-cards be circulated with a view to ascertaining the present opinion of members of this Association and others at once."

Kalasa Medical Fund.—**Resolved :—**That this Association does not see its way to guarantee to Government the payment towards the salary of a Medical Officer, whom the majority of members of the Kalasa community have asked for, through the medium of the Association; but at the same time it will do its best to help them in the matter of obtaining the services of a fully qualified man."

H. H. the Yuvaraja's Marriage.—**Resolved :—**"That this Association do present a casket and address in conjunction with the South Mysore Planters' Association."

Excise.—Read letter from the District Excise Officer, dated May 21st, 1910.

Resolved :—"That this Association notes with approval the prompt way in which Government has ordered the closure of the obnoxious liquor shops situated at Adigebyle and hopes that the shop Mr. C. Courpalais complained about will be removed to the village of Thanigebyle itself, from the 1st July next, as promised by the previous Assistant Commissioner of Excise."

Travellers' Bungalows:—Read the Deputy Commissioner's letter dated May 31st, 1910 with regard to the reappointing of mateys to the Koppa and Yedahalli bungalows.

Hybridisation of Coffee.—Read letter from Mr. F. J. Parton.

Resolved:—"That the Hon. Secretary do write to the Secretary, "U. P. A. S. I., and ask for the insertion of this subject on the "Agenda of the next meeting."

Weights and Measures.—Read letter from the President, Municipal Commission, Civil & Military Station of Bangalore, and his enclosed statement of 'objects and reasons' for standardizing Weights and Measures.

Resolved:—"That this Association is decidedly of opinion that standardization is imperative."

U. P. A. S. I. Agenda.—The subjects on the Agenda were gone through and instructions given to Mr. C. Danvers, who was elected to represent this Association at the forthcoming meeting.

The meeting closed with the usual vote of thanks to the President and Honorary Secretary.

(Sd.) A. F. EVETTS, *Honorary Secretary.*

JAVA'S TEA EXPORTS 1909.

The exports of tea from Java in 1909, as compared with 1908, were as follows:—

		1908. Lbs.	1909. Lbs.
Netherlands	...	20,059,252	20,337,000
United Kingdom	...	12,629,117	12,285,360
Russia	...	1,294,546	1,387,350
Singapore for transhipment to			
North China for Russia	...	2,061,162	970,880
Australia	...	335,095	701,080
Other countries	...	200,364	997,330
Total...		36,579,536	36,679,000

—:0:—

RUBBER CULTIVATION IN BOLIVIA.

Senor Casto Rojas, Under Secretary of State in the Bolivian Ministry of Commerce and Industry, has recently published a volume on the economic and financial situation in Bolivia, in which he comments (*inter alia*) on the cultivation of rubber. The writer states that after Brazil, Bolivia is the most important country in South America for the production of rubber, a circumstance which is not generally known, owing to the absence of ports and the consequent inclusion of Bolivian rubber in the statistics of Chile, Peru, Argentina and Brazil. The immense territory touched by the rivers Abuna, Acre and Madre de Dios on the one hand, and by the rivers Itenez and Mamore on the other, is covered with magnificent forests of *Hevea*. The official figures for rubber production in Bolivia are given as 1,929,608 kilogs., valued at 10,612,848 bolivars, in 1906; 1,830,513 kilogs., valued at 8,841,380 bolivars, in 1907; and 1,818,187 kilogs., valued at 5,402,061 bolivars, in 1908. It appears that rubber cultivation in Bolivia is seriously hampered by the imperfect method of levying the export tax, which varies very considerably in different parts of the country, and appears to be left to the discretion of the individual Customs authorities.

RUBBER.

Fasciation in Rubber Trees.

From Mr. G. N. Stevens, of the Tong-Landor Estates, Chanderiang, we receive an excellent photograph of the fasciated top of a young Pará rubber plant. The top of the shoot is broad and flattened, widening a little upwards and ending in two flat curved branches looking from a side view something like ram's horns. Fasciation of this nature is not uncommon in Pará rubber seedlings and specimens have several times been sent to the Gardens. The same monstrosity is common in very other plants. In fact it is one of the commonest and most conspicuous monstrosities we have. The Cock's comb so common in the Gardens, is a fasciation of a plant which originally had its small flowers in comparatively inconspicuous spikes. *Agricultural Bulletin, Straits and F. M. S.*

SOURCES OF SUPPLY.

The world's present sources of supply for crude rubber are approximately as follows:—

	Tons.
The River Amazon with its tributaries	... 39,000
Other districts of Brazil	... 2,800
The Federated Malay States, Ceylon, Sumatra, &c., (plantation rubber)	... 4,600
The Congo Free State and the French Congo	... 5,600
Portuguese West Africa	... 2,900
The West Coast of Africa, excluding the Congo and Portuguese West Africa	... 9,500
Rangoon, Penang, Borneo, &c., (wild rubber)	... 1,200
East Coast Africa, Mozambique, Madagascar, &c.	... 800
Mexico, the East Indies, and Central America	... 1,500
	<hr/> 67,900 <hr/>

The figures given above are necessarily for the most part estimated, as with the exception of the exports from the Amazon, no exact records are obtainable of the production of the various districts, nor is it possible to obtain a complete record at the different ports of arrival, as statistics of some of the ports can only be obtained in an unclassified form, and from other ports no accurate statistics at all are obtainable.

LIBERIA'S RUBBER INDUSTRY.

The report by the British Vice-Consul at Monrovia (Mr. M. Y. H. Parks) on the trade of Liberia in 1909, states that Rubber collecting is the principal industry of Liberia, but it is yet in its infancy. There is no doubt that rubber is very plentiful right through the vast forests of the interior. The native method of treating rubber at present is somewhat crude, but the quality is very fair, and is equal to the average of the rubber exported from the West Coast of Africa. The seasons for the collection of rubber are in August, and from October to March, between the rainy seasons. The ordinary pay of the native labourer is from 9d. to 1s. per day. One native, working steadily, can easily collect in a day about 3 lbs. of rubber, for which he receives 1s. per lb. The whole of the rubber trade and the collection of rubber in Liberia, is under the supervision of the Liberian Rubber Corporation, Limited, who collect the royalties, or export duties, on the rubber. Any person may trade in, or collect rubber, in Liberia by agreeing to pay the royalties due and to observe the regulations in force relating thereto.

SELECTED CUTTINGS.

Clean Weeding v. *Tephrosia*.

For a long time scientists have called attention to the disadvantage of weeding and have advised the introduction of new methods ; but their ideas have not been well received, and so far little has been done on practical lines.

Interest has however been awakened, experiments with leguminous and other plants are common, and I hope to be able to show that one plant may be used with both economical and other advantages.

In this article it is not proposed to go into the theoretical side of the matter. What at present appeals most to people is the cash expenditure for keeping weeds down, or out, the cheapest way being naturally the most popular one, and weeding will here only be dealt with from this point of view.

Of course with virgin jungle properly dealt with from the start, the weeding bill should never look high, and old established estates will perhaps naturally adhere to their old method.

Most plantations have, however, in one corner or another a block of old abandoned paddy-fields or Malay Kampongs, and in such places a cheap method of getting rid of weeds is much wanted.

I, at any rate as yet, have had the bad luck of getting a few acres of such land indifferently burnt, and all the planters who have seen it have invariably advised me to changkol the whole place at a cost of anything between \$20 and \$60 an acre.

For various reasons this work was not done, but I believe most planters will from experience be able to state, if the above price is correct.

For some time experiments have been carried on with a view to introduce a plant, which would be able to keep weeds out, and at the same time itself benefit, or at least do no harm to, the rubber trees, and for this purpose I have found *Tephrosia purpurea* admirably adapted.

As this plant, seed of which was kindly presented to me by Dr. Treub of Buitenzorg, is new to the F. M. S., some information of how it was established may be of interest.

The first plot was only 20' by 40' and was planted up with one or two seeds in every square foot. The place was then clean of weeds but had not been changkollod, and some lalang had only been cut down, while the roots were untouched.

In the second plot conditions were different.

In belukar land, to save expense, a path or rentis 6 feet wide had been cut along each row of trees, and when at this work the coolies had generally scraped aside a little earth, by which gradually two ridges had been formed, one on each side of the row of trees. In these ridges every few feet a couple of seeds were put in, and after 5-7 weeks all failures were supplied. Otherwise no special care was taken, only of course the coolies were told not to pull these plants up when weeding, and care should be taken to choose a rainy season for this work.

The *Tephrosia* will grow slowly at first, and at four months old it has only grown into a small bushy plant, but it then commences to assert itself amongst the surrounding weeds. When full grown it is about 5-6 feet high, and each plant spreads to the same extent.

My oldest plot was sown in June, and has not been weeded since the end of August, 1907, viz., during 19 months.

One creeper has grown up in it, but in other ways it looks all right, and the lalang, which formerly was on this spot, has now disappeared.

My second plot was planted May last partly in lalang. The *Tephrosia* now forms two solid hedges through which nothing penetrates, and the weeding is here done at a very small cost.

The hedges are sufficiently apart to allow the air to circulate along the trees, and the ground is always soft and nice. So far the time has been too short to show any advantage in growth of trees, but they certainly look as good as any in my clean weeded area.

To make the *Tephrosia* grow in hedges has the advantage of a better air-circulation around the roots, and it also makes it easier to get about when inspecting the plantation; but other methods have also advantages. To take an example, where trees are circled, it would be very easy to put in a few seeds around each tree.

The *Tephrosia* grows rather high, and ought on this account to be cut down once or twice a year, but in other respects this height gives the plant a great advantage, when fighting lalang and other high weeds. As it is not a creeper it may safely be planted together with rubber stumps, coffee, etc., without fear of their being interfered with; and as it is a good fertiliser, has few natural enemies, is very hardy and propagates itself when once established, it must be considered an ideal plant for its purpose.

Under the conditions mentioned the planting of *Tephrosia* represents a great and direct saving. Having however reached so far, it might be rather interesting to see, if the step could not be taken in full, and the same plant be introduced with advantage also in clean estates.

The question is what clean weeding costs, and how much money could be saved by planting *Tephrosia*.

The general opinion is that 30 cents an acre a month is a low price for weeding. This is often not sufficient, and also it is only the pay of the coolies and does not include anything for management and other consequent expenses, so that really the expenses are much higher, and a fair idea of what it costs would be obtained by charging all expenses for upkeep of an estate to weeding, as of course little other work remains to be done.

If an estate when first planted up could be left to itself until the trees came into bearing, then the saving ought to be at least 1'50 an acre a month, and in many cases much more, or say as a low figure 20'00 per annum; and it now remains to be seen what it costs to establish *Tephrosia*, and if by this proceeding the above money could be saved.

The first item is easy to settle, I have found \$4'00 an acre ample and to spare.

The second point is also easy; experience from abandoned estates and other places show that, if not hampered by lalang or grass, trees will grow as well or better under natural conditions, that is in weeds, as in clean land.

[Comparing the merits of the two methods in a tabular statement the writer shows that the total expenses for 5 years clean weeding are \$100, whereas with *Tephrosia* they are only \$34.

He puts the cost of establishing *Tephrosia* at \$4 per acre, and the cost of cutting it down twice at \$2 per acre, items such as keeping drains clean, supervision, &c., bringing the cost up to \$10 for the first year, and in the following years this becomes \$6, as the cost of establishing the plant is to be deducted.]

F. Zernichow, in the *Agricultural Bulletin*, Straits and F. M. States.

The Planters' Chronicle.

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(INCORPORATED.)

Para Rubber from Old Trees.

In Vol. V, No. 1, p. 4, reference was made to the finding of the Scientific Department of the Department of Agriculture, U. S. A., that rubber (Pará) from young trees "is not materially different from those of much greater age." Commenting on this, Mr. H. N. Ridley, of the Singapore Botanic Gardens, observed recently in the *Straits Bulletin* :—"This is rather remarkable as it is easy to feel the difference in a sheet of a five-year tree and one of 20 years old." He added a letter giving a report on some rubber from old trees in the Botanic Gardens "which especially as regards strength" is very superior to ordinary plantation rubber. Unfortunately, however, this letter is by no means conclusive, for it had reference to rubber "smoked" in a special way, and described as "a new grade on the market, being different from the ordinary."

Mr. Ridley himself observes that the rubber was prepared carefully "but in no way that plantation could not be prepared." It is manifest, however, that most plantation rubber is not prepared in that particular way, so the question as to the cause of the superiority of this particular lot can scarcely be considered answered fully by the remark that, presuming the American experts were "working with good plantation rubber, clean and well made, the only thing that seems obvious is that the old trees of the Botanic Gardens produce a stronger rubber, and that is due to their age."

It would be interesting if any planter could throw light on the subject. Messrs. Gow, Wilson and Stanton, of London, reported of the "lightly smoked sheet rubber" from Singapore :—"We consider that the rubber is one of the best samples that we have seen from the East of this grade, especially as regards strength, which, judging from the ordinary crude tests, appears to be very materially above the average of plantation rubber, and to compare favourably with hard Pará."

The point to be considered is, whether the fine quality was due to the age of the trees stamped, or to some peculiarity in the method of curing.

The P. B. F.

By a slip of the pen acknowledgment was made in last issue of a donation of Rs.439 as having come through the North Mysore Planters' Association, when the South Mysore Planters' Association was the real remitter of the amount.

The Latest Recruit.

The recently formed Association, admitted to membership of the U.P.A. S. I. as the Cochin Planters' Association, appears to have been already renamed "The Cochin and North Travancore Planters' Association."

Scientific Officer's Papers.**XXXII.—TOUR IN THE NILGIRIS.**

From 9th May to 5th June I was in the Nilgiris and made several tours, and visited some of the districts I was unable to see when in the Nilgiris in July 1909.

I attended the annual meeting of the Nilgiri Planters' Association held at Ootacamund on 28th May, and delivered an address there.

From 9th to 17th May, I visited estates in the Ouchterlony Valley, where I was much impressed with the appearance of the Coffee. It appears to be a district eminently suited for that crop, and though the dreaded *Green Bug* (*Lecanium viride*) is present, the heavy monsoon conditions annually check it. Despite this, however, it is a mistaken policy to disregard the Bug altogether. Its presence on the trees, even for a month or so, must do a certain amount of damage and tend to weaken them, and the first time the season is abnormally dry, or the monsoon late, the Bug may get such a hold that it will be difficult to eradicate. Every precaution should therefore be taken to kill the Bug as soon as it appears, and prevent its spread. When there is only a little it is easy to prune it out, and spray, or brush the affected trees. Unnecessary plants apt to be attacked by the Bug should be destroyed. For example, in one place I saw a hedge by a road-side covered with the Bug. The hedge was unnecessary, and could in any case be easily replaced by a fence, or a wall. Attention to little details such as this will make all the difference between keeping this pest in check and allowing it to get the upper hand.

On many estates in the Valley the practice of digging old established Coffee has been abandoned, and methods of mulching are adopted and approved of. This is exactly in accordance with my views which have been expressed in the *Planters' Chronicle* (Vol. IV, p. 280). The soil should be got into a good tilth by hard digging each year at the beginning, before the young plants have pervaded all the surface soil between the rows with their roots. An annually narrowing strip can be forked each year, and forking must cease when the roots begin to be cut. This is the answer to the question, "how long can forking be done?". The tilth having been obtained in the early stages of the plantation should be maintained afterwards by keeping the soil heavily mulched; a good soil will never lose tilth under these conditions.

At the bottom of the Valley *Albizia stipulata* grows exceptionally well and is popular on Tea estates. It should be used as a green dressing and not as a shade tree, however, and it should not be allowed to get too big before it is cut down and used as a mulch. At Daverashola Estate several leguminous plants are being tried as green dressings and I shall watch the result of these experiments with a great deal of interest.

During the rest of my stay in the district I made frequent short tours, and inspected many different estates cultivated in Coffee, Tea and Rubber.

When I was in the Kullakambai District in July 1909, the Coffee was very badly attacked by Green Bug, the stems and primaries of many of the trees being black and covered with scales, and the trees almost denuded of foliage. My advice given then was, amongst other things, to prune the trees, burn the prunings, mulch the soil and apply manure. I was shown some fields which had been treated in this way and they had made a very marked improvement; a good growth of wood had been obtained, and the trees were covered with healthy foliage.

The trouble is always a recurring one, however, as a large number of shade and forest trees are infected, and the present prices of Coffee will not justify a large expenditure on remedies such as spraying. This being the case, systematic attempts should be made to replace the Arabian Coffee by hybrids which are resistant to scale insect attack, and give increased yields. I have pointed out the advantages to be obtained by this method, both in the *Planters' Chronicle*, and at the Annual meeting of the Nilgiris Planters' Association, ("P. C.," Vol. V, pp. 126 and 241). A starting point already exists in the Nilgiris themselves where there are some excellent hybrids well worthy of better attention than they have hitherto received. A reference to the advertisement columns of this paper will also show that a limited number of seeds and plants are for sale at Chundrapore Estate in Mysore. I am convinced that if the Nilgiris are to remain a Coffee growing district in the future, it will be by means of such hybrids.

It is said that the Pulneys, which in former years were so badly attacked by Green Bug, are now practically free from it, and estates which were at one time almost abandoned are now giving big crops. I have not yet had the pleasure of visiting this district so I cannot vouch for the truth of this statement, which I often hear made, but, granting it to be true, there is no guarantee that history will not repeat itself, and the attack begin all over again. I do not wish to discourage coffee planters in the Pulneys, but I should think that this is in all probability what will happen. Year by year things get worse and nothing is done; in fact little can be done, spraying being declared on all hands to be impossible, or too expensive. Why not therefore work up the hybrids and replace this coffee which is admittedly being killed out?

Ceará Rubber is in many places on the Nilgiris a most promising crop, and possibly therein lies a way of escape for coffee planters in the worst districts. The lower the rainfall the less difficulty there appears to be in handling Ceará rubber, and excellent prices are being obtained. During my visit I saw the best lot of plants of the new varieties of Manihot I have so far come across. These were in a light soil at an elevation of 5450 feet. The difficulty of germinating the seeds of these varieties appears to be insuperable, and plants should be propagated by cuttings as much as possible. When planting up Ceará too it is well to find out, by preliminary tapping, which are good latex yielding trees, for they show a great deal of variation in this respect, and use cuttings from these. Such will grow true to type which seed will not do.

I am glad to find that on many estates experiments are being conducted with leguminous plants suitable for green dressings. I do not consider that anything like enough importance is as yet attached to the damage that is caused by wash. Annually many tons of the best of the surface soil is washed down and lost, and on sloping land especially the loss is a very heavy one, both in plant food and surface soil. This loss should be avoided by every possible means, and one of the easiest ways of preventing it is to grow a cover crop on the land during the monsoon, instead of leaving it bare and exposed to the rain. The manurial value of these crops is also considerable. With the falling prices of coffee, and the increase of disease, the manure is being reduced, and green dressings supply it in a cheap form. The best way of handling such cover crops is, however, to manure with a mixture of about 15% of Potash and 11% of Phosphoric acid before they are sown and leave the green dressings to supply the nitrogen. This is probably an excellent method for tea. *Cassia mimosoides* has been established by Mr. P. Beaver at Sholarock, and is, in my opinion, an ideal cover crop. At Nonsuch Estate four or five

plants are under trial, and *Cassia tomentosa* is found to be most useful for supplying mulch and green material to bury, as well as serving as a wind break. This plant is the common yellow flowered *Cassia* seen all over the Nilgiris, and it is grown in rows here and there between the Tea, and cut at intervals. Specimens of several other likely plants were collected and will be identified as soon as possible.

On Tea estates at the time of my visit the prevalent disease was the *Brown Blight* (*Colletotrichum camelliae*). This is largely climatic, due to the prolonged drought, and good rains will do more good than any methods of control. Where the attack is very bad it would be well to strip off the affected leaves and burn them. Another pest in evidence was Brown Bug (*Lecanium hemisphericum*), a scale nearly spherical in shape and of a light chestnut brown colour, and somewhat polished. This can be controlled by spraying with Kerosene emulsion, and probably the Vermisapon Specialties Co.'s insecticide would be found a cheap and effective remedy. This stuff is made locally at Coimbatore, and is easily handled, as it is put up in tins of a convenient size ready for use, and is soluble in cold water.

Another pest which at some seasons of the year gives a good deal of trouble is *Red Spider* (*Tetranychus viculatus*). This is usually checked by dusting the bushes with Sulphur, and Sulphur is preferable to mixtures like Calcium sulphide which have been tried in some places. The sulphur should be applied on a still day without wind and early in the morning when the bushes are wet with dew. The sulphur falling on the damp leaves will stick well. It should remain on the leaves for several days, for though it kills the adult insect it will not kill the eggs and it is only when these hatch out and young insects come into contact with the sulphur that they are killed. One objection to this method of treatment is that the presence of the sulphur gives a taste to the tea, and so a flush has to be abandoned, or to wait for rain to wash it clean. This is probably unavoidable.

The district is, I believe, free from Mosquito Blight, so that the practice of burning the prunings is an unnecessarily wasteful one. The prunings should be buried, and if they are covered with spider or scale, should be at the same time sprinkled with Lime or Basic Slag. Burial of prunings adds much needed humus to the soil.

I notice the Silver Oak (*Grevillea robusta*) is planted a great deal as a shade in Tea. Care should be taken about this as in some districts it is found that when this shade is lightened and it is necessary to kill a tree, stump rot is always produced, and considerable losses have been sustained.

This need not necessarily be the case in the Nilgiris, but it would be advisable to find out whether Silver Oak produces stump rot after its death in the district. Should it do so, care must be exercised in planting it, and when it is necessary to remove a tree the stump should be dug out as completely as possible. For this work a stump puller will be found useful.

In conclusion my sincere thanks are due to the planters of the district for their hospitality. I much regret the illness of the Secretary of the Planters' Association which prevented me paying a long promised visit to the Kundahs, and I am gratified to hear that Mr. Barber is now on his way to complete recovery.

RUDOLPH D. ANSTEAD,

Planting Expert.

Notes and Comments by the Scientific Officer.

48. *Dadap as green dressing.*—A correspondent asks whether Dadap (*Erythrina lithosperma*) cuttings can be used as a green manure, and what the effect would be compared with artificial manure.

Dadap makes a very good green manure indeed. The cuttings should be chopped up and laid over the soil as a mulch to the depth of say six inches. The best time to put them out is just before the monsoon to prevent wash, though it is a good thing to have the soil covered with them as a mulch in the dry weather, so that it does not really much matter when they are put out. In the case of Tea, when the forking is done the cuttings can be forked in.

Dadap is usually grown with the crop to supply this green material, being cut when it reaches a height of about six feet and allowed to grow up again to give another crop of cuttings, and so on.

Dadap leaves are rich in lime and contain about 1.14% of Nitrogen as a rule. The best white castor poonac contains about 5% of nitrogen, so that a ton of Dadap leaves may be considered equal to about 515 lbs. of best white castor poonac.

49. *Acid and Alkaline manures.*—A Coorg correspondent asks what is meant by acid and alkaline manures, how they can be distinguished, and what are their respective relations to the soil.

Alkaline manures are those, like Basic Slag and Basic Superphosphate, which contain a free base like lime; or manures which react with the soil to leave an alkaline bye-product, as for example Calcium Cyanamide, which leaves carbonate of lime behind as a bye-product of its reaction with the soil.

The first class of alkaline manures neutralise free acids in the soil produced by excess of organic matter, and are good correctives for sour soils, and soils naturally deficient in lime content.

Acid manures may contain free acid, as badly prepared Sulphate of Potash occasionally does, or may have an acid reaction on the soil. For example, Sulphate of Ammonia combines with the carbonate of lime in the soil. On soils initially poor in carbonate of lime, (as the majority of South Indian Coffee soils are) the constant use of Sulphate of Ammonia alone would soon reduce them to a condition approaching sterility.

Superphosphate, again, is an acid manure and requires the presence of a base, like carbonate of lime, to precipitate the soluble phosphoric acid as a calcium compound. On many soils there is such a deficiency of carbonate of lime that the phosphoric acid is precipitated as Iron or Aluminium phosphates which are much less soluble in soil water, and so are less available to the plant. On such soils an alkaline manure like Basic Slag is much more effective.

50. *Weevils on Fruit Trees.*—Specimens of a small grey weevil which does a good deal of damage to the foliage of fruit trees in the neighbourhood of Ootacamund have been sent in. They appear in January and February just at the time the trees are breaking into new leaf.

This weevil is *Myloccerus discolor*. The genus *Myloccerus* contains a number of species, several of which are very destructive to the foliage of economic plants in India.

The remedy is to dust Paris Green, or a mixture of Paris Green and dry slaked lime in the proportion of 1:6, over the foliage through coarse cloth. If this is done when the leaves are damp it will help it to stick.

RUDOLPH D. ANSTEAD, *Planting Expert.*

DISTRICT PLANTERS' ASSOCIATIONS.**Shevaroy Planters' Association.**

Proceedings of a Quarterly General Meeting of the Shevaroy Planters' Association held in the Victoria Rooms, Yercaud, 1-30 p.m., on Monday, 13th June.

PRESENT :—Messrs. R. Gompertz, A. B. Kandasawmy, C. Rahm, W. Rahm, B. Short, C. G. Lechler, and C. Dickens, (Honorary Secretary and Chairman).

(1). *Proceedings* of last Committee Meeting were taken as read.

(2). *New Member*.—Mr. L. E. T. Short, of the Nagalur District, introduced by Mr. B Short, was elected a member of this Association.

(3). *Delegates to Bangalore for coming Annual Meeting*.—Resolved that Messrs. B. Cayley and C. Dickins be asked to represent this Association at Bangalore.

(4). *Special Constables for patrolling Estates during Crop*.—Read letter dated 18-5-10 from Acting Superintendent of Police, Salem, with reference to above subject.

Resolved, that the Honorary Secretary be requested to write again to Superintendent Police, asking him for a reply to his letter dated 11-3-10.

(5). *Special Soap for destroying Green Bug*.—Read letter dated 25-4-10 from Superintendent, Vermisapon Specialties Co., Coimbatore, and letter dated 19-5-10 from Imperial Entomologist.

The sample tins of Soap for experimenting with were distributed to the following gentlemen :—Messrs. R. Gompertz, A. B. Kandasawmy, and W. Rahm, who will send in their reports to the Honorary Secretary.

(6). *Revolver Licence*.—Read letter dated 8th June from Mr. A. B. Kandasawmy of the Puthur Estate, to Honorary Secretary asking this Association to back his application to the Collector and District Magistrate, Salem, to be allowed to purchase and keep a Revolver.

Resolved, that the Honorary Secretary be requested to write to the Collector and District Magistrate on the subject, and forward Mr. Kandasawmy's petition.

(7). *Rubber*.—Mr. L. E. T. Short exhibited some very good samples of Ceará rubber biscuits cured by him from the Nagalur District.

(8). *Roads*.—Yercaud to Valalkadai feeder Road.

Read and recorded No. 610, dated 31-5-10, from Executive Engineer, Salem, also the following Circulars from Secretary U. P. A. S. I. :—

No.—13/10 dated 14th April.

14/10	16th	„
14/10	21st	„
16/10	5th	May
17/10	5th	„
18/10	9th	„
19/10	11th	„

No.—20/10 dated 14th May.

21/10	17th	„
22/10	19th	„
23/10	19th	„
24/10	21st	„
25/10	24th	„

(9). The following books were placed on the table.

Agricultural Ledger.—“The Composition of Indian Rice” by David Hooper, F. C. S.

“Indian Peas,” by H. Borkill.

“Crotalaria juncea,” by Windham Dunstan.

(10). With a vote of thanks to the Chair, the Meeting terminated.

(Sd.) CHAS. DICKINS, *Hon. Secy. & Chairman.*

CORRESPONDENCE.**Planting Politics.**

Sir,—The Annual General Meeting of the U. P. A. S. I. will soon be with us and the planter politicians will once again discuss, and try and settle, many vital questions which will crop up. I am writing to you in the hope that a letter from an outsider may be the means of calling forth opinions from the non-politician planters on various subjects which have been, and will again be, discussed.

First, as a coffee planter, I would mention *Coffee Cess* in large letters. The King once said, "Wake up England," and I say, "Wake up coffee planters," or East Indian Coffee will be completely ousted out of the English market by Brazilian, as China tea has been by Indian and Ceylon. What is the use of a coffee cess of 2 or 3 annas a cwt? It is like applying cattle manure with a teaspoon and expecting great results. Why don't the Solons of the industry apply for a cess of a rupee a cwt., which would give enough money for advertising our coffee at home quite apart from a general scheme such as the London Chamber proposed? Two years of such an advertising campaign under the aegis of the coffee section of the London Chamber would add at least 10s. a cwt. to our general price from the extra demand for East India Coffee which would arise, or history would not be repeating itself, and would repay the rupee a cwt. outlay several times over.

Why is it too that when the supreme subject of advertising at home, and pushing the sale of our coffee is brought forward, some one always gets up and demands a share of any money collected to push coffee in India?

London is the coffee market; increase the sale in England, and create a demand, and London will increase the price and it will react automatically in India.

(2) If planters prefer to "wait and see," they will in a few years see the taste for mild coffee die out of England and be replaced by the harsher tasting Brazilian. Pushing coffee in India is quite another thing, and should not be mixed up with pushing coffee in England. Push it in India by all means, but why not push it in the great centre first? It is better to do one thing thoroughly than two things half-heartedly.

"COFFEE."

Green or Pulney Bug in Coffee.

Having done some Coffee with Rosin, Soda, and Soap, as recommended and largely practised by Mr. Nicholson, both with Brushing and Spraying, I am anxious, considering the immense importance of the subject, to communicate the results so far, in hope that it will be found interesting and helpful to Brother Planters.

I would have preferred carrying on my trials for a year ere going into print, but much valuable time may be lost thereby, and loss continued to unfortunate Proprietors of Coffee Estates.

I have found Mr. Nicholson's wash excellent; applied either with Brush or Sprayer. The latter has to my mind failed so far in our hands owing to 2 causes, viz., 1. Dilution of the wash for Sprayer, 2. Wanting to see results as rapidly as is seen with the Brushing.

Brush work I have found very expensive; as a cooly (with all deference to the opinions and statements of others) can but do 7 to 10 large trees, and that only apparently thoroughly. On a 5 acre block I got the work done at Rs.8 per acre, but here the trees were very sparsely covered with foliage, owing to repeated and neglected attacks of Bug. On large trees on another

place, the cost has been undoubtedly Rs.30 per acre for labour. The average cost here, however, let me explain, was Rs.10 an acre, because only a third of the Estate was done.

The cost of the material, at Soap 1, Rosin 1, Soda 1, to 4 gallons of water, and 12 gallons per acre, works out to about Rs. 5 only.

I used No. 16 Paint Brushes, which can be obtained at 6 annas each from Messrs. Hoe and Co., Madras, and found these far superior and more economical in every way than the coir brushes of cooly make! The injury to the trees is nil too, as compared with the coir. 3 hours after the brushing, not a single bug remains green to the naked eye and in a few days there is a burst of new leaf that is quite encouraging. I find, however, that 3 days after a few small bugs are visible here and there, and these soon spread over of course, as the Planter knows only too well; still there is enough done, to my mind, to urge men to adopt this treatment at once, and most vigorously; for given as with me Rs.2,000/- worth of crop on 30 acres, it is certain that an expenditure of Rs.1,000/- on the treatment of the Bug, will insure all of this crop being picked, while, without, not a half will be obtained. Thus with the treatment, one spends practically NIL; and has healthy trees at the end of the crop for the next year.

I need hardly say that the procuring of Labour for a large acreage at the supreme moment is almost impossible, and this has given possibly pause to Planters.

With the Sprayer I found that if the 4 gallons be diluted to 10 as most would do, and as advised in Mr. Lefroy's work, the result is, so far as a careful inspection after a week can indicate, FAILURE, but with the same strength in Sprayer as with Brush, although the day after, and for many days, there is a most disappointing appearance, and the green with the venomous V staring you in the face, from day to day more and more are *browning* off, and it seems, at time of going to Press with this, that the Sprayer will, as anticipated by our Scientific Officer, TRIUMPH.

If my anticipations turn out correct, I should be sorry not to have given earliest intimation of possibilities, so I trust I shall be pardoned for rushing into publicity so soon after experiments.

When Mr. Lefroy visited these Hills and gave practical demonstration with Sprayer, I was one of the first who invested in a Sprayer, through our energetic Secretary Mr. Brock of Kotagiri, who, I fear, with me found that the application was ineffectual. Anyhow, Mr. Brock moved on a couple of years after to pastures new, and the Nilgiri Planters' Association lost one of its most energetic and much appreciated members.

I feel now that the mistake was that the mixture was not nearly strong enough to kill the insects. A neighbour, however, adheres to somewhat the same as shown us then, and declares he has had steady success with it, for the past 5 years, and it was to his kindly urging that I owe the fact of my again turning to the spraying, which has resulted in this article.

It may be as well to give clearly, and in simple language, the mode of preparation of the mixture.

Take a lb. of each of the following :—

Rosin. Soap. Washing Soda.

Powder, and mix the Rosin and Soda, placing mixture in a kerosine tin with a little water, place on a *gentle* fire and boil, adding cold water from time to time as the stuff boils up, continue for about an hour, then add the

soap, shaved into slices, stirring up until all is melted, remove from fire and leave to thoroughly cool. When cold, add more cold water to fill up tin (4 gallons).

To apply with brushes, proceed exactly as a man does with his chin for shaving. The greater the lather the better the result. I have called this, "Nicholson's shaving brush application."

For the Sprayer, use the 4 gallon mixture without addition of more water. A double nozzle does good enough work, and is quicker. A cooly can easily spray 300 trees in a day or, say, an acre in 3 days.

I would advise a Knapsack Sprayer per 10 acres, which means that for a 200 acre garden, 20 Sprayers and 20 coolies only, employed for a period of a month at a time, for each 3 sprayings needed.

The cost would work out as follows :—

Material for an acre	... Rs. 5 0 0
Boiling for 3 Sprayings at 9 annas a spraying	... „ 1 11 0
Labour at Re. 1/ per spraying	... „ 3 0 0
Renewals for Sprayers approximately	... „ 0 5 0
	<hr/>
	Rs. 10 0 0

This is the cost given by Mr. Nicholson for the Brushing system, but whereas his is an *average cost*, this is *particular cost*, for affected acreage only.

I shall at all times be pleased to allow anybody to visit the places on which the spraying is being done, so that personal inspection might be added to the information here given. For those around Coonoor, Carolina is quite handy, while the Katrinefalls Estate, Hallacarry Village, can be seen by any Planters out in that direction,

It will be necessary, I should add, that the treated trees should be cultivated if the Bug is to keep off. I have noticed that where by cultivation the trees have the power of remaking foliage the fungus we so much desire to have propagated comes on spontaneously, which is quite a new point deserving attention, for if my observations have been correct it affords one explanation how healthy trees throw off this as well as all other pests!

THOMAS BROWN,
Glendale Tea Estate.

17th June, 1910.

N. B.—Many are not aware that the steel-blue Lady Bird has appeared on the Adderley Estate in large numbers spontaneously.

Notice to Correspondents.

C. J. W., Mercara.—Your letter has been referred to the Scientific Officer, and will be published and replied to in our next issue.

The following extracts are taken from the Diplomatic and Consular Reports of France for 1909 :—

Coffee.—This product is slowly and surely increasing yearly and the export for 1909 shows some +61 tons, of the value of £31,037, as having left for France and other ports—an increase of over 29 per cent. for 1909.

Rubber.—The quantity of rubber exported in 1909 was only 27 tons, valued at £8,420; this industry is very feeble and may be considered as finished, owing to the continued disregard of instructions regarding the preservation of trees. The present price of rubber, local is 4s. 8½d. per lb.

SELECTED CUTTINGS.

How to cultivate a Tea Estate.

With reference to the difference between Mr. Joseph Fraser and Mr. Petch, about the burying of prunings, I would certainly back Mr. Fraser's practical experience against Mr. Petch's theory. The actual quantity of nitrogen &c., in the prunings is not of so much consequence as the incalculable value they have of introducing humus into the soil. To destroy them by fire is the wilful waste of a fool, and reminds me of Lamb's Chinaman, who burnt down his house to get roast sucking pig. The excuse planters make for this fearful waste is that they do it to destroy the borer. Now I venture to say that it has done little or no good, for on one estate which I know that has burnt prunings for the last three years, the superintendent tells me that it has done little or no good. To bury your prunings with an extra dose of sulphate of potash, say 112 lbs. per acre, instead of the usual dose of 51 lbs. per acre, is the most profitable way of getting rid of the borer; only superintendents will not do it because it takes more coolies than burning. The reason I say sulphate of potash will kill the borer is that you never find borer on tea near a set of lines where there is an excess of potash in the soil. What would be said of a farmer in England who burnt his straw &c., on the land? There is nothing more strictly covenanted in farm leases at home than that the straw shall not be sold off the land.

Humus.—Decayed vegetable matter. I give the meaning because fifty per cent. of my brother planters know nothing about humus, nor the part it plays in the growth of plants.

Extract from "The Tropical Agriculturist," November 1908:—

"All soils in tropical climates are more or less devoid of humus,—unless they have been recently cleared of their virgin forest, or are formed of the washing of the surrounding hills. The main cause of this absence of humus is the fact that decomposition goes on constantly and the excessive rain washes out the soluble matter.

"The presence of humus not only adds to the fertility of soil, but makes it more porous and open, thus increasing the water-holding capacity."

Read Bamber's report on Ceylon tea soils, and see the poor amount of organic matter on most of the estates that have not been heavily manured. Do we in Ceylon make any serious attempts to increase the organic matter in our estates? I think not. We do not bury our prunings, consequently the sticks are carried off by the coolies for fire-wood, (on most estates that is the only fire-wood they have), the leaves dry up in the sun and are powdered to dust by the feet of the coolies, and with the first shower of rain the dust is washed into the nearest drain. We neglect to plant crotalaria or dadaps, because we fear to increase the so-called weeds. I know of no country in the world in which such an insane method of cultivation is carried on. The Indian planter digs his weeds twice a year. Orchards at home are not clean weeded. The Italian vine growers give humus to the soil by heaping up gorse and heather between the rows of vines. A farmer at home plants grass and clover, and ploughs it in so that the roots may rot and bring humus into the soil, for, without humus, artificial manure has little or no effect. With clean weeding we do not allow nature to cover her nakedness; every poor little weed that sinks its root into the soil to open, it up and serve as a duct, to admit the air and rain into the soil, is snapped up. Why is it that returns of large quantities of artificial manure vary so much on different estates? Simply the want of humus in the

soil. If a soil has humus the bacteria are able to convert artificial into soluble matter that the roots can take up. The soil of most of our old coffee estates is so poor in humus that artificial manures will not give a fair return. I have buried prunings on five estates both in low and up-country, and I have never known mycelium to originate in the holes in which the prunings were buried, nor do I think it likely, if care is taken to sprinkle the prunings with Basic Slag and Sulphate of Potash. In most of the Tea Companies' reports for last season 4 to 5 cents. per pound made tea have been spent in manure and cultivation. That means that manure costs 4'95 and application '05 of a cent. This I do not call cultivation, it means, perhaps, that the manure has been forked in above every tea bush. This is a profitable business for the manure sellers, but a very bad thing for the shareholders. Some years ago I read of a Managing Director getting up and telling a Company meeting of shareholders that he did not think it right to apply "forcible" manure to their estate; the fact of the matter was he did not intend to apply any manure; the price of tea was low, and he was reducing everything except his own fees, but the stern logic of facts soon taught him that he could not go on year after year taking everything from the soil and putting nothing back; for diseases, grey blight, &c., broke out and then he had to manure, and now he has gone to the very opposite extreme, and you hear of 840 lbs. to 900 lbs. artificial manure being applied per acre. How much of this large quantity is wasted it is difficult to tell, but I should say that fully half never does the tea bush any good. The farmers in America and the Indian planters have found out that it is more profitable to apply artificial manure in small quantities, and are spending more money on cultivation. The practice of clean weeding is, I am convinced, radically wrong, and it means disease and death to tea as it did to coffee in the old days. One of the members of the Legislative Council said in Council that, in his opinion, it was injudicious manuring that had killed our coffee. I think it was more likely that it was the foolish system of clean weeding, as very few estates got any artificial manure in those days, and those only in the neighbourhood of railways. In Haputale and Badulla the coffee made the best fight against the disease. The estates on that side had not been cleanly weeded, limed, or had artificial manure; consequently there was more humus in the soil, and they were able to withstand the disease longer, and, had not coffee gone down in price, would have grown coffee till this day. In South India Coffee is still grown to pay, but they dig their weeds in twice a year. On the other hand it was the comparatively new estates in Dikoya and Dimbula on which coffee first went out; it was on those estates that clean weeding was systematically carried on. A farmer at home does not collect and burn his weeds, he ploughs his grass, his stubble, and potato haulm into the ground so as to increase the humus in the ground, for without humus you cannot get bacteria, without bacteria a plant cannot obtain soluble food from the soil, and he also knows that without humus, artificial manure will not help him. Without humus in the soil tea will not thrive. Our scientists have told us of a plant that collects nitrogen from the air, *Crotalaria*. How few planters up-country have planted it! Is it the fear of weeds, or because the V. A. thinks that artificial manure is better and more profitable to the estate? I suppose it is too much to expect planters in general, and Visiting Agents in particular, to know anything of agriculture, but it would be a good thing for some of them to spend a week-end at the Royal Botanic Gardens, Peradeniya, to learn something about what they call weeds. All weeds are not harmful to tea; some are beneficial and should be encouraged; if they do nothing else, they save wash and thus conserve the humus. It takes little sense to see that in heavy rains the water runs clean off a field that has a

good coating of grass or weeds, and from a field that has been well cultivated (well-forked), there will be no wash. Does any one give a thought to the number of the coolies that have to tramp a tea field to do the work?

				Coolies.
Weeding	3 coolies	per acre	per month	... 36
Pruning	15 "	" "	the estate every 2nd year.	7
Plucking	at 400 lbs.	tea	per acre	16,000 lbs. leaf
	average 20 lbs.	leaf	per cooly	... 20
Manuring	...	...	...	12
Other works	...	...	...	5
				<hr/> 80

What is the state of land on most of our estates after all this tramping? Very much like a sun dried brick, impervious to air and water. A farmer at home cultivates grass because he is able to do with less manure and grow corn. A farmer uses eleven kinds of seeds to plant up a grass-field, some nitrogen collectors, others deep feeders. I suppose I shall be told that you cannot use a plough on a tea estate, but is there any reason against using a hoe or a fork? The hoe was invented a long time before the plough. What I would recommend is to stop wasting money on clean weeding. Let your weeds grow, and fork or hoe them in every three months.

The cost would be approximately on an estate pruned every 24 months:—

				R.	C.
Fork over the whole estate, 3 times a year, at Rs.6 per acre	...			18	00
Manure half the estate: Broad-cast the manure and fork it in					
Rs.24 per acre	...	...	...	24	00
Bury prunings and weeds at the same time, half the estate,					
Rs.4 per acre	...	...	...	4	00
				<hr/> 46	<hr/> 00

This would be equal to digging over the estate a fourth time.

Against present cost—

Weeding	Rs.1 per acre	per month	...	...	12	00
Burying prunings	...		...	...	4	00
Manuring and application	...		...	...	50	00
					<hr/> 66	<hr/> 00

I only put down three weedings in a year, because, if you prune half the estate every year and bury your prunings, that will be equal to digging half your acreage, and you will scrape all your weeds into the hole with the prunings. In forking in manure, say, half the acreage in two years, that will be equal to digging half the estate. I am convinced that half the artificial manure now applied is wasted. The most costly parts of these mixtures are mineral salts containing nitrogen, which so quickly dissolve in our heavy rain-fall that the roots of our tea bushes have not time to assimilate them. Let your artificial manure be composed of castor cake and fish manure. Leave out sulphate ammonia, which is not only an expensive manure, but so easily soluble in wet weather that the tea bush has no time to absorb it. Basic slag and sulphate of potash is applied with the prunings.—*The Times of Ceylon, 11th June 1910.*

The Planters' Chronicle.

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Scientific Officer's Papers.

XXXIII.—CATTLE TICKS.

Some time ago a correspondent in S. Travancore complained that his cattle when grazing got covered with Ticks, especially round their eyes, and asked for a remedy.

Most of the washes recommended for Ticks are complicated and expensive, but a simple remedy which was found very effective some years ago in Jamaica, where grass Ticks are very troublesome, was suggested. It is simply to paint the affected parts of the cattle with coal tar water applied with a brush. Coal tar and water in equal proportions are shaken together, allowed to settle, and the tarry water which floats to the top is poured off and used. More water is shaken with the residue, and so on, until all the tar is used up.

This remedy was tried and, I hear, has done a good deal of good in mitigating the nuisance.

In Jamaica stock rearing, or pen keeping as it is there called, is a large and important industry, and ticks are a plague. The most serious result of their presence is that one of the species is responsible for the transmission of Texas fever from sick to healthy animals.

Last year Prof. Newstead, of the Liverpool School of Tropical Medicine, visited Jamaica to investigate the matter, and a most interesting report on the Ticks of Jamaica, together with an article by the Director of Agriculture on practical measures for the prevention of Ticks, appear in the Bulletin of the Jamaica Department of Agriculture for April 1910.

Those who are interested in Cattle, and find Ticks a nuisance, would do well to peruse these articles. The ticks which infest cattle in India may not be the same species as those recorded, in Jamaica, but much of Prof. Newstead's report applies to ticks in general, and the remedies proposed would equally apply to India.

Prof. Newstead describes the life cycle of Ticks as follows :—

"All ticks undergo a metamorphosis which consists of the following stages :—1, the egg ; 2, the larval, or 'grass louse,' stage ; 3, the nymph ; and 4, the sexually mature stage.

"**Eggs.**—These are laid upon the ground in masses, apparently in sheltered spots. At first they are pale brownish-yellow, but eventually change to translucent brown, resembling the colour of common commercial glue. As incubation advances, a small whitish spot appears beneath the cuticle, evidently formed by the excreta of the embryo. The incubation period varies in the different species, and temperature has evidently a marked effect upon the development of the embryo. These produce :—

"*Larvæ*, '*grass lice*,' or '*seed ticks*.'—All larvæ are six legged, and the sexes are not distinguishable. On hatching from the egg they crawl up the stems of grasses and other plants, usually to the topmost leaf or stem, congregating together sometimes in enormous numbers. The 'clusters,' or 'nests,' are, as a rule, the progeny of one parent. They remain in such situations for a host; meanwhile no kind of food is taken as a substitute for blood; and they are capable of fasting for very long periods. . . .

"*Nymph*.—In this stage also there is no sexual distinction. The animal has now increased in size, though it may be, and often is, smaller than a fully engorged larva. Again the tick fills itself to repletion, the body becoming greatly distended during the process. Shortly after feeding, the nymphal skin is cast and the sexually mature stage is reached.

"*Adult Tick*.—The sexually mature male and female are often identical in size immediately after the change from nymph to adult. Little change takes place in the male after feeding; but the female in filling her body to repletion becomes enormously distended, increasing in size from thirty to forty diameters. She falls from the host when fully engorged, and after the lapse of a few days, begins to lay her eggs.

"This process is continued over several days, and in the end the female dies, leaving her body attached to the little mass of eggs. This is briefly the metamorphosis of the cattle ticks."

The method of prevention recommended is to spray the Cattle with a wash consisting of Paranaph 1 pint, or 20 ounces, Cooper's Dip 1 ounce, Water 3 quarts.

Paranaph is a mixture invented by Mr. H. H. Cousins, Director of Agriculture, Jamaica, and is made as follows:—"To 56 lbs. of the best Soft Soap add 2 gallons of water. Simmer over a fire with constant stirring until all lumps have disappeared, and a perfectly uniform melt has been obtained. Add 6 lbs. of crude naphthalene and stir until dissolved. Remove from the fire and add 2 imperial gallons of ordinary kerosene oil and stir till uniform." The finished product is semisolid, and dissolves readily in cold water so as to give a milky emulsion, and it is, by the way, recommended as an excellent remedy for fleas in houses and on dogs.

The cattle wash is made thus:—A little of the water is used for stirring up the Cooper's Dip into a uniform creamy liquid. The Paranaph is dissolved in the residue of the water, using a clean stick to stir it. When dissolved, the Cooper's liquid is added, and the whole thoroughly stirred. The arsenic is in a solid state and settles to the bottom, so the wash has to be kept well stirred.

The wash is sprayed all over the animals, care being taken not to get it into their eyes. The amount of wash needed for a cow is said to vary from 1 to 2 quarts. The spraying should be repeated in 7 days and, if Ticks still appear, 10 days later. After this, spraying should be done every 3 weeks whether ticks are seen or not.

It is claimed that if this treatment is carefully carried out for a period of two years or so the pastures will be quite free from Ticks. The cost is very small. The standard wash is said to cost, in Jamaica, approximately 1 anna per quart, and a cow to require a minimum of one quart to a maximum of two quarts. Mr. Cousins says, "Taking an extreme case requiring 18 applications in the course of 12 months the materials would not cost more than 2 shillings (Rs.1/8), per head, per annum for the cost of treatment. The improved thriftiness of the stock should repay this cost in an ample manner, as a direct financial undertaking, quite apart from the value of the actual destruction of ticks on any holding where spraying with Paranaph and arsenic wash is properly and systematically carried out".

RUDOLPH D. ANSTEAD, *Planting Expert*.

Notes and Comments by the Scientific Officer.

51. *Coorg Girdler Beetle*.—During a tour in Coorg my attention was called to a *Girdler Beetle* which rings the branches of *Erythrina lithosperma*, often cutting them off completely.

This beetle has been identified at Pusa, by the Imperial Entomologist, as *Sthenias grisator*. It flies and works at night, resting during the day time in the forks of the branches, where it can be easily caught, and should it become a troublesome pest the easiest way of dealing with it would be to have it hand collected by children. This plan is, in fact, adopted on some estates in Coorg.

The life history of the beetle is thus described from Pusa. The female beetle lays its eggs in the bark and then girdles the branch below the spot where the eggs are laid. This kills the branch, which may or may not fall off. The larvæ which hatch from the eggs bore into the dead branch and feed on the dead wood.

Hence it would appear that if the girdled branches are collected, and burned, the larvæ will be destroyed, and the pest kept in check.

The beetle attacks Crotons and Rôses, as well as *Erythrina*.

52. *Latex cups*.—Now that so many Rubber Estates have reached the tapping stage, the question of the most suitable form of cup in which to collect the latex has cropped up. As pointed out in the *Planters' Chronicle* (Vol. V, p. 187), in Mundakayam very suitable cups are made from a coconut shell. They are cheap, easily replaced, and easily kept clean. The latex washes out of them very readily, and when they are not in use they are hung in an inverted position on the top of a short stick thrust into the ground at the foot of the tree, to prevent them being splashed with mud during wet weather.

Mundakayam is near a big source of supply of coconut shells, which makes this a cheap and ready method; but other Rubber districts are not so favourably situated, and in these tin, or enamelled, cups are generally used. Tin is apt to corrode, however, under the warm moist conditions obtaining on Rubber estates, and enamelled cups are difficult to keep scrupulously clean. Glass vessels have several advantages over those made of other materials. The latex is easily washed out of them, and they can be kept very clean, and occasionally boiled out with acid if necessary. They can be obtained in all shapes and sizes, and some are made with rims and holes so that they can be attached to the tree in all positions. They are usually made with a conical base so that they can be stuck into the ground. This also prevents their being stolen, as they will not stand on a hard surface, and so are useless for other than their legitimate purpose. They can also be made with the name of the estate moulded on them, which renders them easily recognisable.

53. *Horse Flies*.—When in the neighbourhood of the Ouchterlony Valley I made the unpleasant acquaintance of a Horse Fly, which attacked me and my horse in clouds in some places, biting us both, and especially the horse, in a most distressing way. This Fly is a species of *Haematopota*, one of the *Tabanidae*, or Gad-fly family, in which the females are blood-suckers. The males are more respectable and feed on plant juices, &c. The larvæ are usually aquatic, and live in the mud by the edges of streams, or in swamps, and they pupate in the ground. Not much is known about the different species in India, but the fly found in the Ouchterlony Valley, or one very much like it, is figured in Lefroy's "Indian Insect Life."

RUDOLPH D. ANSTEAD, *Planting Expert.* *

DISTRICT PLANTERS' ASSOCIATIONS.**Anamalai Planters' Association.**

Proceedings of an Extraordinary General Meeting of the Anamalai Planters' Association, held at Paralai Bungalow on Thursday, 2nd June 1910.

PRESENT :—Messrs. G. L. Duncan (Chairman), A. H. Sharp, G. A. Marsh, E. W. Simcock, C. H. Brock, H. W. de Salis, A. C. Cotton, R. F. Vinen, J. O. K. Walsh and J. H. Jones.

1. *Membership.*—Mr. J. H. Jones was elected a member of the Association.

2. *The late King-Emperor.*—Resolved: That a resolution of condolence be recorded at the lamented death of H. I. Majesty King Edward VII.

3. *Proceedings of Meetings.*—The proceedings of the Extraordinary General Meeting held on 31st March 1910, and of the Committee Meetings held on 16th March 1910 and 19th May 1910, were read and confirmed after previous circulation.

4. *Further Grants of Land.*—The following resolution was proposed by Mr. Brock and seconded by Mr. Marsh :—

“That this Association request the Government of Madras to
“reconsider the question of further Grants of Land to planters
“in the Anamalai Hills, and to entertain further applications for
“the same: and that the Chairman write to the Collector of
“Coimbatore notifying this resolution and detailing the views of
“this Association as expressed at this Meeting.”

On this Resolution being put to the vote it was carried by 4 votes, 30 votes being in favour of and 26 votes being against the Resolution. 3 votes remained neutral. A draft of the letter referred to in the Resolution was read, revised and adopted.

5. *Branch Roads.*—Mr. Simcock asked the Chairman if any further correspondence had been received on this subject. The Chairman was asked to write to the Secretary to Government, Public Works Department, requesting an early reply to this Association's letter, dated 19th March 1910.

(Signed) GEO. L. DUNCAN,
Chairman.

A COMMITTEE MEETING.

Proceedings of a Committee Meeting held at Kalyanapandal Bungalow on 9th May 1910.

PRESENT :—Messrs. C. H. Brock, G. L. Duncan, G. A. Marsh, A. H. Sharp and E. W. Simcock.

Proceedings of last meeting taken as read :—

Green Tea Bonus.—The Committee resolved that in view of the prospect of a Finishing Factory being established in South India, this Association requests the Indian Tea Cess Committee to renew the bonus on Green Tea.

Scientific Officer.—Read and recorded U. P. A. S. I. letters dated 3rd and 5th May 1910, re: Laboratory for Scientific Officer.

Medical Officer.—With reference to U. P. A. S. I. Secretary's letter of 7th May 1910, the Secretary was instructed to give effect to Hon'ble Mr. J. G. Hamilton's letter regarding this matter, pointing out that it is not pro-

posed to ask the U. P. A. S. I. for assistance. The Honorary Secretary was instructed to write the President, District Board, asking him to inform the Association, what steps the District Board are taking with reference to the upkeep of the proposed hospital, and if plans for construction of hospital are being prepared, and if a site had yet been chosen.

Further Grants of Land.—A Preliminary draft letter was drawn up, to be submitted for approval, at Extraordinary General Meeting to be called on 2nd June 1910.

Cinchona.—Read U. P. A. S. I. circular No. 14/10 dated 21st April, 1910, quoting the Hon'ble Mr. J. G. Hamilton's letter 18th idem. The Secretary was asked to reply, giving area under Cinchona in the district, which is approximately 350 acres, and stating that the owners would not uproot the trees, provided Government fell in with Mr. Hodgson's suggestion, as quoted in circulars No. 19/18 dated 11th May, 1910, and would of course guarantee to supply Government, with all bark harvested on this area. It was intimated, that several estates in the district were prepared to open out further areas, under Cinchona from imported seed, (Java), provided Government agreed to adopt a scheme on the lines suggested.

Chaplain's Visit.—Read Mr. de Salis' letter regarding the Chaplain's (Coimbatore) visit. The committee were of opinion that the Association could not move in the matter.

(Signed) GEO. L. DUNCAN,

Chairman.

PHOSPHORUS.

The *Indian Agriculturist* remarks:—This essential is taken in by the plant in the condition of soluble phosphate; although it is applied to land in such forms as bone-dust, bone-meal, ground-bones, slag, superphosphate, etc. The Phosphorus in bones is absolutely useless as it exists, or, in other words, it is "unavailable;" but when the bones rot as they do in a soil, though slowly, the phosphorus is changed to phosphates which are soluble and can then be taken in as plant food, when it is said to be "available." The finer the bone is ground, the more readily "available" is the phosphorus in it for food. Whole bones take years before being any good as manure, while bone-meal is much quicker in its action.

APPLICATION OF MANURES.

An application of any very soluble manure to land must be given with proper caution; because the very fact of its being soluble renders it more liable to be washed out of the soil in drainage water during and after heavy rain. Such a soluble and valuable fertilizer as nitrate of soda should be applied when the crop has germinated, and again later on, so that by giving two or three dressings the plant is able to absorb it instead of its being washed away. Where a slower acting nitrogenous manure is required sulphate of ammonia or farmyard manure, etc., is better because it is less soluble and, therefore, less likely to be lost, and the nitrates as they are formed in the soil are mostly absorbed at once on a well cropped area. From the above it is seen that if land rich in nitrogenous material be left fallow, the whole of the nitrogen is "nitrified" or changed into nitrates, and instead of being used by a crop these are washed out of the soil by heavy rain.

CORRESPONDENCE.

Tephrosia purpurea.

Karie Kollie, Mercara,

21st June, 1910.

Dear Sir,—Is it possible to prepare, and print in the *Planters' Chronicle* illustrations of leguminous plants for information? Botanical names convey practically nothing to the non-botanist, and it is very possible we may have the very plant in question under our noses, so to say, and yet be sending far afield for seed.

Is the *Tephrosia purpurea*, by any chance, known under the Canarese name *Kardu Togary Sappu*?

Yours faithfully,

A. J. WRIGHT.

[*Note by the Scientific Officer* :—I quite sympathise with Mr. Wright's difficulty, but the Editor informs me that the *Planters' Chronicle* cannot yet aspire to illustrations.

The local names of plants are very misleading, and the name given in Canarese, or Tamil, to a plant in one district may be applied to a totally different plant in another district, and the wild plants have no English popular names as they have at home. Hence the *Botanical name* is the only reliable one to go by, and a planter must learn to recognise these leguminous plants, and then add the Latin names to his vocabulary. After all it is just as easy to remember that a certain plant is a *Tephrosia*, as it is to remember that it is a *Geranium*, or, for that matter, *Togary*.

The Canarese name of *Tephrosia purpurea* round Arsikere, where it grows in great quantity, is *Oogin Gidda*. Mr. Graham Anderson has most kindly supplied me with some interesting information about local names, and he writes that this plant does not grow in his district, Saklaspur, and so is unknown to the coolies. The name of *Kardu Togary Sappu* is there (Saklaspur) applied to quite a different plant, a kind of wild Dholl common in Mysore, while Dholl (*Cajanus indicus*) is called *Togary*.

This plant would make a good cover crop, but wherever I have found it its roots have been infested with Mealy Bug (*Dactilopius citri*). This scale has done a great deal of damage in Coorg, especially to young coffee, so that this plant must be classed as a weed and be eradicated from coffee estates.

The initial difficulty, I admit, is to recognise the particular plant which is being talked about. To overcome this, as the plants cannot be illustrated in the *Planters' Chronicle*, and descriptions from which they can be recognised are very difficult to compose, an attempt will be made to supply the Coorg Planters' Association, and other Planters' Associations, as far as possible, with herbarium specimens of the plants in their district suitable for cover crops. These can then be inspected at the Association meetings, and the plants recognised, and their correct names learned. In return, it is hoped that planters who know of other suitable specimens, or the local names of those exhibited, will communicate with me, so that the information may be recorded in the pages of the *Planters' Chronicle*. The important work of determining which of these plants is best suited to the conditions of each district, soil, and crop, can only be successfully performed through the ardent cooperation of the planters in each district.—RUDOLPH D. ANSTEAD, *Planting Expert*.]

Green Bug in Coffee.**BRUSHING AND SPRAYING METHODS.**

In my article on the above subject please,
for "12 gallons per acre,"
read "80 gallons per acre."

It will be noticed that the cost of a kerosine tin full of the wash (4 gallons) works out to approximately 4 annas, *viz.*, Rosin 1 anna, Soda 1 anna, and Soap 2 annas, and for Rs.5, 20 tins full or 80 gallons of wash is obtained.

I find that with an ordinary sprayer nozzle, it is difficult to get coolies to run the quantity (80 gallons) over an acre, and I have therefore sent for a "Mistry" nozzle, which is stated to give a finer spray. Failing this, it is advisable to follow the practice of my neighbour and dilute to 8 gallons, but this practice I have no certain knowledge of personally, and, if followed, results must be carefully watched, not forgetting that time is needed for full action.

Personally I think the stronger solution most advisable, even though cost be doubled for material, *per spraying*.

In the cost I lost sight of the 3 sprayings, which would treble cost of material of course and would make the following correct :—

Material for an acre at Rs.5 per spraying	...	Rs. 15	0	0
Boiling for 3 sprayings at as 9 per spraying	...	" 1	11	0
Labour at Re.1 per spraying	...	" 3	0	0
Renewals for Sprayer approximately...	...	" 0	5	0
		Total	Rs. 20	0 0

Given one-half of the Estate affected, the average cost will be Rs.10 per acre for 3 Sprayings per annum.

Coonoor, 24-6-10.

(Signed.) THOMAS BROWN.

Mr. T. Brown in the course of a letter to the Planting Expert writes :—
"Re the "Green Bug" in the Ouchterlony Valley, there is enough on the little Coffee left on Perishola to stock the world. It is the heavy shade and the mulch that keeps it down on most of the places, to my observation. I have a piece on Garolina under similar conditions which the Bug never troubles, although individual trees get the Bug, on the Borders of the 2 acre plot. Here I have no doubt that 'Burning or Scorching' would keep the Bug away, or to be more correct APPEAR to do so! I never pay any attention to the Bug that appears on the individuals mainly from a desire to test my theory !!!

"I have no experimental plot below my office here, and the same applies to this. I have a Guava Tree next to this plot, choked with Green Bug and have lately stacked Bug Coffee Stumps purchased from my Neighbour on to it, yet the Bug gets no headway on to the plot.

"Here let me explain that TO-DAY I have cut off all the Erythrina leaves and mulched ground to get Coffee to bear bumper, fortified by the results of my spraying tests! I have read with interest your articles on green manuring and the results attained by the Experimental Plots at Peradeniya, and wish to follow up on the lines indicated, and GROW COFFEE instead of ERYTHRINA while still retaining the latter, paradoxical as this might appear to the Uninitiated!

"Peradeniya has had some 12 hundred pounds of tea per acre from Mulching with Erythrinas, against some 500 only from the use of Manures both Cattle and Chemicals."

RUBBER.

Tapping Manihot Rubber Trees.

At the Rubber Exhibition held in London in 1908, the best method for tapping Ceará rubber trees was the item most freely discussed among those who visited "Tropical Life" stall. There is no doubt, at least there seemed to be none at that time, that a perfect Ceará tapper has still to be invented. We proposed using six or more spurs in a row, like the Bowman-Northway pricker, supplied with a regulator to prevent the spikes going in too deep, and though this met with general approval no one seems to have taken the idea up, or if they did we have not heard of it.

Meanwhile, on p. 196 of our December (1909) issue, we mentioned that both in Hawaii and Nyasaland the herring-bone system of tapping Ceará has given quite favourable results.

Whatever system is employed, the entire outer bark, which is tough and papery, must be removed, and the younger bark left smooth and clean. In Hawaii it has been found that the average Ceará tree stops its flow of latex by complete coagulation within from two to five minutes when water is not used.

In Bulletin No. 16 of the Hawaii Agricultural Experiment Station, issued in July, 1908, important particulars are given of tapping experiments undertaken on old trees. In one instance the age is given—*viz.*, nine years. The conclusions arrived at show that there seems to be some relation between atmospheric conditions and the flow of latex, but it has still to be determined what this relation is.

The best time to tap is at night or during the early morning. The flow of latex is said to be highest between midnight and 7 or 8 a.m. In Hawaii they found those trees that were tapped either just before the resting period, or during the time when bare of leaves, did not leaf out as quickly as others near at hand which had not been tapped. If it was, according to Mr. Wilcox, difficult to coagulate the latex at times, both at Kanai and Oahu double the amount of rubber, generally speaking, was procurable by trickling water containing ammonia over the tapping area, than when no water was used. At Koloa some trees planted about 1894 were tapped in 1907-8. Two of them were then 44 inches in circumference at 3 feet from the ground, and both branched at 6 feet. These two trees, although they were terribly scored by promiscuous tappings (?), or rather hackings, still yielded 18 oz. of washed rubber in nine days' tapping, and it was then considered that had vertical incisions been used instead of the herring-bone system, a very much larger yield of rubber would have been obtained. As it was, a good deal of the latex was wasted on account of the inequalities of the bark. Generally speaking, the Hawaii experients on these old trees caused those who were carrying them out to consider that daily tappings for a period of two or four weeks or more would yield much better results than tappings on alternate days, or at longer intervals, over a period of several months. Daily tappings it was found for a period of nine days gave better results than tapping on alternate days for double the time, and the recovery of the tree was more rapid. Young trees were not so readily injured by too deep cutting as older trees. In young trees the wounds, it is found, healed very rapidly.

The explanation as to why the flow of latex is very much heavier and more rapid during the night is to be found in the fact that during the hours of darkness there is an almost complete cessation of evaporation from the leaves, but the roots still continue to take up water from the soil, and this results in greater tension of the sap and the latex in the tree. The latex of young trees coagulates more slowly than that of old ones. In Hawaii when vertical cuts were used, a canvas bag was tied round the tree above the cuts.

The bag went half round the tree, and was sewn up in two places, as well as at the ends. Three compartments were thus formed, one for each vertical cut that ran down from the centre of each compartment. The water is conducted to the cut by means of a piece of porous cloth sewn up the centre of each compartment of the bag, which otherwise would not have leaked, or would have done so in the wrong place. This porous or water-conducting cloth protrudes evidently through the bottom, and so, although sewn in, the water at these places can ooze through and down the vertical cuts. The bag is left on the tree during the whole tapping season. About a pint of water is put in each bag (whether the whole bag or each compartment is not quite clear), and about $\frac{1}{2}$ oz. of ammonia per gallon of water is added. Younger trees need rather less ammonia, for their latex, as stated above, coagulates more slowly. Whether herring-bone or vertical cuts are best remains to be seen. In Java one man claims that the vertical cuts are best, but several planters, and journals, speak well of the herring-bone method. There seems no doubt, however, that the Ceará is unreliable in its yield, and that on this account young estates must be watched and tested as soon as possible, and those that show signs of not being good tappers must be replaced by others; Jared Smith recommends doing this by means of cuttings from trees known to be good. It would be interesting to examine the trees removed, as being poor tappers, in order to see if their roots, or tubers, or any portions of them, are poorly developed or over abundant, so as to account for the poor latex yield of the tree.

It may be remembered that about January, 1908, the *Times of Ceylon* mentioned a report of the *M. dichotoma* in Brazil yielding a ton of rubber per acre. As that cautious, but ever polite, journal added, this sounds much too good to be true. They quote Dr. Ule's description of the Brazilian tapping of the *dichotoma* in its native wood. We are told he taps the stronger trees with a sinuous or wavy cut, using a knife which is either bent at the point or truncated. Sometimes a straight cut is used, with or without lateral cuts. The latex cup is attached to the bark to catch the milk. If tapped carefully the wound heals after a time, and the tree can be tapped again and again, from three to ten times. We suppose this means during the tapping season, which, as a rule, is not for the whole year.—*Tropical Life, May 1910.*

Yields from Ceara Trees with different kinds of Tapping.

In Bulletin No. 19 of the Hawaii Agricultural Experiment Station, entitled *Experiments in Tapping Ceará Rubber Trees*, an account is given of experiments which were conducted with a view to ascertaining the difference of yield of latex, when V cuts were employed, from that obtaining when the cuts were vertical. In the first trial, ten trees were divided into similar groups of five. It was found that the time required for making the different kinds of incision was the same, being about seven minutes for each group. The trees tapped with a V cut gave $2\frac{1}{2}$ oz. of dry rubber; those with the vertical cut gave $6\frac{1}{2}$ oz. The greater yield in the latter case is partly due to the fact that the length of the incision with vertical cuts is greater than that with V cuts. The rate at which the latex ran from the vertical cuts was greater than that from the V cuts; the amount of scrap rubber left behind was about the same in each case. The healing of the bark took place in the same time in each case, and there was no difference in the smoothness of the surface of the renewed tissue.

Another experiment was conducted with twenty-five trees, which were tapped for five days in succession, fourteen vertical cuts 6 feet in length being made during this time, in each case. The purpose of this trial was

to ascertain if there is any economy in making more cuts per day, and in this way using up the bark of the tree in a shorter time. The result was that no advantage was indicated from the use of four vertical cuts daily instead of two. The total amount of rubber obtained from the tree was 12.3 oz., of which 6.2 oz was good, dry rubber.

A further experiment with eight trees at the station gave results again in favour of the vertical cut. These were not affected by the employment of a water bag to wash the latex into the pan and to keep the wounds fresh.—*Agricultural News*, Vol. IX, No. 210.

Corticium javanicum in Borneo.

A correspondent to the *Agricultural Bulletin of the Federated Malay States* gives the following description of the Pink Fungus (*Corticium javanicum*) of Pará rubber:—

"In the first instance drops of latex may be observed exuding from the tree just as if a prick had been made with a needle. By degrees these punctures increase in number and the latex trickles down the stem freely.

"The above phase in the initial stages of this disease is a prelude to the formation of black patches on the bark, which gradually increase in area. On removing the dead bark with a pen-knife pads of evil smelling rubber are found within and the rot has penetrated right through to the wood.

"Subsequently to this "buboks" (*Xylotrupes* probably) make their entrance and together with a pinkish fungus seem to complete the destruction. I cannot accurately time this fungus, but have known the tops of five year old trees to be completely reduced by it in a week, so the destructive element appears to be fairly rapid. We suffered heavily last year during the monsoon, but got rid of the disease by tapping, burning, and tarring, at the same period, as a preventive measure, all scars on trees throughout. It seemed as if old wounds and rough places on the bark afforded an easy entrance to the fungus we were trying to stamp out.

"One peculiar feature I must remark is that our trees have been attacked anywhere either from the collar upwards, or from the topmost branches downwards.

"In both cases, if attended to promptly, the tree does not generally die, but its growth is seriously retarded, especially when pollarding old trees has to be resorted to.

"I have often noticed trees recover by themselves without attention, viz., (a) a 1½ year old tree died off from the top about 5 feet and then shot up again below the affected part, (b) a 5 year old tree (measuring 30 inches at 3 feet above ground) suffered from the fungus round the collar and upwards for about four inches. There were three distinct dead patches round the trunk, but the disease was suddenly checked and new bark began to make its appearance. The above instances are only two out of many. The fungus apparently does not confine itself to Pará rubber trees as I have just noticed two young trees in my garden, known locally as Saga, (*Adenanthera pavonina* L.) attacked by identically the same thing."

The Editor says, "The branches appear first to be covered with small raised spots of cork scattered more or less thickly about, which eventually split and become small black sores. When these have become numerous, it can be seen that the whole of the cambium layer and all but the outer bark layer is dark brown or nearly black and rotten and the characteristic pink "writing" fungus appears. The damage is however done before this appearance of the pink fungus. It is quite possible that, as Mr. Bean suggests above, the fungus is a wound parasite as other species of *Corticium* are."

SELECTED CUTTINGS.

The Internal Application of Fungicides.

The treatment of fungus diseases by the injection of fungicides has been the subject of experiment for the last 30 years, without any success which would justify practical application. The idea is periodically revived—whenever the general public awakes to the fact that tropical commodities are for the most part the product of plantations which may suffer from the attacks of disease. I have received several suggestions as to treatment of diseases during the last year, all based on the same idea, viz., that the plants could be “watered” with carbolic acid, or copper sulphate, etc., and thereby rendered immune to disease.

With regard to the article referred to by you a few errors may be pointed out first. Mr. G. F. Scott-Elliot has not experimented on this subject: he has found, rather late in the day, Mokrschetzki's experiments (I wonder whether you will spell that correctly), and has written a short account of them in the *Gardeners' Chronicle*, February 5th, 1910, about six years after they were performed. Mr. Elliot does not “describe the method,” but he completes his article by stating: “I had myself been in the habit of showing an interesting class experiment which depends upon the introduction of some harmless colouring matter into the stem, before I had heard of these experiments,” and he goes on to describe the experiment quoted by Mr. Fox. The apparent suggestion of priority here is ludicrous, for similar experiments have been known since the dawn of physiological botany, and are performed even by students in elementary classes. Moreover, Mr. Elliot's experiment is only rarely practicable, as it depends on the internal pressures of the tree. Finally, nothing of the nature of an “Antitoxin” is used, or has ever been obtained, in plant diseases.

We may now consider the actual facts. Mokrschetzki, in 1903, published a preliminary paper in the “*Zeitschrift für Pflanzenkrankheiten*” on “The Internal Therapeutics of Plants.” He described his method, which consisted of placing a powder in a hole in the tree, or forcing a solution into the stem under slight pressure by specially constructed apparatus. The method bears no resemblance to that quoted by Mr. Fox. The result given by the latter is taken from that account; apple trees affected by chlorosis were rendered green in ten days by placing 12 grams of dry Iron Sulphate in a hole in the stem.

This paper evoked an indignant protest from Schewyrjov, who claimed that he had published a description of this special apparatus in 1894, and had advocated its use in plant pathology. He also showed that the method had been employed in cases of chlorosis in the Crimea in 1895 and 1896, and that account of these experiments were published in 1898 and 1903.

Mokrschetzki published a further account of his experiments in 1905. He had modified his method by placing nutrient salts as well as iron sulphate in the hole. He claims to have obtained good results in cases of chlorosis of apple trees, and gummosis of apricots, plums, etc.; but experiments with fungus diseases of apple and poplar trees were not successful. Mr. Elliot has quoted the paper of 1903, but he is apparently unacquainted with that of 1905.

There are several kinds of “Chlorosis”: and the application of Ferrous Sulphate has long been recommended as a treatment for one of them. But the cause of chlorosis is quite unknown. Similarly the cause of gummosis has not been discovered, or rather numerous causes have been discovered, but pathologists in general refuse to accept them. It is highly probable that many, if not all, cases of chlorosis and gummosis are due to physiological

causes, not to fungi. Consequently we have the result that Mokrschetzki's treatment, *viz.*, the introduction of nutrient salts plus ferrous sulphate into holes in the trunk of the tree, has been successful in diseases of unknown cause (probably physiological), but, by the author's admission, has failed in the case of fungus diseases. There does not seem any reason, therefore, why it should be recommended for a fungus disease of *Pterocarpus*.

Two other instances of the internal application of fungicides may be quoted. In 1904, Masee published an account of a successful experiment in which Cucumber and Tomato plants, watered with a dilute solution of Copper Sulphate, proved immune to certain common leaf diseases. The method was adopted on a large scale by Tomato growers in 1905, but it resulted in complete failure.

More recently attempts have been made to treat diseased apple trees by injecting Copper Sulphate into them. "Copper sulphate solutions were injected through roots and through holes in the trunks of the trees, and uniformly resulted in browning of the leaves. The time required to give evidence of the injury varied with the strength of the solution and the rate of transpiration, but it is usually short, varying from 25 minutes to a few hours."

The difficulty which the advocates of this treatment have to overcome is this. With any fungicide, the concentration required to kill a fungus is greater than that which will kill a flowering plant, if the latter is made to absorb the solution.—*Mr. T. Petch in the "Ceylon Observer."*

(We reproduce in elucidation of the above letter the second portion of Mr. Fox's paper referred to, entitled "Notes on the Angsana Tree Disease in Penang," from the *Straits Bulletin*, as follows:—

Since the receipt of this communication I have read some extremely interesting work done by Mr. G. F. Scott-Elliot in the curing of plant diseases. The method adopted, is by the injection of antitoxin as is done in medical practice. He also mentions an experiment made by Mohrzecki where an apple tree suffering from chlorosis, or the yellows, which presented a sickly and languishing appearance due to the chlorophyll (green colouring matter of plants), having developed imperfectly. An injection was made into the trunk of an apple tree (9 inches in diameter) of a solution containing 12 grams of iron sulphate. In ten days there was no trace of chlorosis, and after 3 weeks, the leaves were dark green, and to all appearances perfectly sound and healthy. Mr. Elliot describes the method as exceedingly simple, using plasticine or putty, in the case of small trees, to make a circular basin round the stem, which is filled with water containing the solution of the fungicide. In the case of large trees like our Angsana it would probably not be necessary to make a basin all round the tree, but probably a series of cups at short intervals round the base of the tree would suffice. The stem is then pierced with a sharp knife when the fungicide would pass into the sieve tubes and so be taken up by the sap, and come in contact with the disease. Injection does not seem to be so successful with resinous, and possibly also latex bearing trees. The method, however, which is only outlined here, seems to afford a very promising field for experiments—*W. Fox, Superintendent, Forests and Gardens, Penang, February 28th, 1910.*—*[Ed., C. O.]*

Under the Madras Planters' Labour Act, 1903, H. E. the Governor of Madras in Council has authorized Mr. James Edmond Bisset, Mayfield estates, the Nilgiris, to witness the execution of labour contracts.

The Planters' Chronicle.

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Laboratory for the Scientific Officer.

The following memorandum by the Scientific Officer is printed for general information :—

" In U. P. A. Circulars recently issued, the question of a laboratory has been mooted, and it is hoped that the matter will be definitely settled at the coming Meeting in Bangalore. The various Planters' Associations have generally expressed themselves as agreeing that a laboratory is necessary, and in order to clear away certain doubts which have been expressed, I should like to take this opportunity of telling planters exactly what I want, what it will cost, and how I propose to use it, and emphasise the following points :—

" 1. A laboratory is absolutely essential to enable me to deal with many of the planting problems submitted to me, to the best of my ability.

" 2. The laboratory must be not merely a chemical one, but fitted for general work, so that plant diseases, fungi, and insects, can be studied.

" 3. The cost of such a laboratory will be comparatively small. Detailed estimates, which I have drawn up, enable me to state that apparatus, chemicals, and fittings, sufficient for my purpose, can all be obtained for the sum of Rs.2,500.

" 4. Suitable premises have already been obtained, tentatively, adjoining my office. This is also essential to enable me to make the best possible use of a laboratory. Work can then be done during intervals of correspondence, and general work.

" 5. The annual upkeep, including rent, will be Rs.1,000, and *no more*.

" 6. I do not propose, having got a laboratory, to do nothing but chemical work, but merely to use it as a necessary aid to my work, in much the same way as one uses a pen, or a lens.

" 7. I realise that touring, with frequent visits to the various districts and estates, is by far the most important part of my work, and I can assure planters that I do not wish to give up this to the laboratory, and *I propose, in the future, to do as much field work as I have done in the past, or more if necessary.*

" 8. I propose to use the laboratory chiefly for investigations of special problems of general interest, and not to make innumerable soil and manure analyses for individuals, which can be done by professional analysts. Laboratory work would be done chiefly during intervals of routine office work, and during the monsoon months, when touring is not only difficult, but, as a rule, unprofitable.

" I hope that this brief statement will outline the position, and reassure those who may think that, given a laboratory, it is the last they will see, or hear, of their Scientific Officer on the estates."

It will be observed that the *maximum* figures given in the above are as follows:—

First cost	...	...	Rs.2,500
Recurring expenditure (annual)	...	...	Rs.1,000

Planters will see, therefore, exactly what funds must be furnished if the Planting Expert is to have the laboratory he considers essential to the full development of his work on their behalf. The annual expenses will comprise such items as rent of premises, cost of kerosene oil and water, and replacement of chemicals, &c., used as work progresses.

Act I of 1903.

IN MALABAR.

In the course of his report on the working of the Madras Planters' Labour Act, I of 1903, in the Wynaad for the year 1909, Mr. R. B. Wood, I. C. S., Acting District Magistrate of Malabar, states that no cases were instituted in 1909 in the Court of the Sub-divisional Magistrate, Wynaad, or the Tahsildar-Magistrate. There was one case pending in 1908 in the latter Court and this was withdrawn in 1909. 442 and 13 cases were filed in the Courts of the Sub-Magistrate, Vayittiri, and Shirishtadar-Magistrate, Wynaad, respectively.

A tabular statement shows that in 1909, as in 1908, the great bulk of the cases were under section 30 and section 24. It is explained that two cases instituted under section 23 were by planters against maistries; 142 of the 209 cases registered under section 24 were also by planters against maistries, the balance being by maistries against sub-maistries. Of the 228 cases instituted under section 30 in the Court of the Sub-Magistrate, Vayittiri, 11 were by planters and the remaining by maistries against labourers. All the 12 cases under the same section filed in the Court of the Shirishtadar-Magistrate were by maistries against labourers. It will thus be seen that exclusive of the cases filed by planters and pending in 1908, 155 cases were instituted by planters themselves during the past year as against 137 only in 1908. The number of prosecutions in Tourimala, Achoor, Cootacavil and Pootoomala estates rose from 88 in 1908 to 229 in the year 1909. These estates passed under the management of the East India Tea and Produce Company during the year; and either they took prompter measures against the defaulters or the managers understood the Act better, and are more inclined to use it. Mr. Wood appears to think that both causes were operative.

He concludes his report thus:—

"The Act appears to have worked satisfactorily during the year; a few difficulties which arose and were brought to my notice were due to the mis-interpretation of the Act by the Sub-Magistrate, Vayittiri, and not to defects in the Act itself."

IN THE NILGIRIS.

Mr. W. Francis, I. C. S., District Magistrate of the Nilgiris, reports that the number of prosecutions instituted under the Act rose from 767 to 963. The rise in the number of cases filed during the year occurs chiefly in the Gudalur taluq and is entirely due to the increased use made of the Act by maistries there. Superintendents of estates in Gudalur themselves filed only four more cases against coolies than in the year previous, whereas maistries brought 239 more cases.

The number of cases filed under the Act and the number of estates in which they arose are noted below for each taluk:—

		Estates.	Casse,
Coonor	...	29	152
Ootacamund	...	5	14
Gudalur	...	41	797

Over 25 prosecutions were instituted in each of the undermentioned

estates:—Coonoor taluk, Thaimalai 41. Gudalur taluk, Devarashola 134, Guynd 60, Suffolk 46, Kelly 45, Glenvans 45, Mayfield 43, Balmadies 40, New Hope 39, Wentworth 38, Hope 33, Lauriston 33, Seaforth 27, Woodbriar 27.

Mr. Francis proceeds to say:—"The heavy pendency in the Gudalur taluk attracted my attention at the beginning of last year and I have been trying to remedy matters. It is due almost entirely to the non-service of warrants issued against labourers on the complaint of maistries. Section 29 of the Act allows a complaint against a labourer to be sent in to a Magistrate by post, and a warrant against him to be issued, without the personal attendance or examination of the complainant. Complaints usually state that the accused is supposed to be absconding in such and such a village or estate, which may be either in British Territory or Mysore. The case is taken on file as a matter of routine and a warrant is issued in accordance with the particulars given in the complaint. As the accused's name and father's name given therein are said to be usually insufficient by themselves to lead to his identification in a place which is not his native village, it has been the practice here (I am trying to trace its origin; it is said to be founded on a request from the planters) to send the warrant to the prosecuting maistry with instructions to get it served through the local police when he has succeeded in tracing the accused's whereabouts. Often the name of the police station is left blank, to be filled in by the maistry when the accused has been traced. Scores of such warrants are in the hands of maistries and the courts have no means of knowing or finding out what action is being taken to get them served. Some of them have remained a couple of years with the maistry unserved, and all this while the case remains pending. Some warrants are handed over eventually to the police for service, and they frequently return with the endorsement that the accused is not in the village mentioned in the warrant and that his whereabouts are not known. The complainant is informed accordingly and asked to say whether he has any later knowledge of the accused's whereabouts. Very usually he has not and again the case remains pending indefinitely until he gets a clue; but sometimes he has heard from other coolies that accused has gone to such and such a village. Another warrant then goes out, often with the same lack of definite result; and a case may thus be pending for years. Some months ago endeavours to reduce the number of cases pending in Gudalur taluk were made under my orders by having them all arranged by estates and then sending the Taluk Magistrate to each estate in turn to ascertain from planters and maistries whether they would allow any of them to be withdrawn and struck off the file. But this had little result, as in most cases the complainants were unwilling to withdraw cases so long as there was any the faintest hope of eventually getting a clue to the accused's whereabouts. This pendency is certain to continue to increase in a cumulative fashion unless some further action is taken and I have now called for detailed particulars of all unserved warrants to see whether the police or the maistries are the more to blame for the non-service of warrants and whether the system of receiving complaints by post and entrusting warrants to maistries had not better be given up. I am told that if it is, fewer warrants than ever will be served, but I am not convinced that this is so. The matter, however, is full of difficulties for which I do not at present see clear remedies and I propose, with the permission of Government, to report separately upon it when the necessary information is more complete.

"The greatly increased use of the Act by maistries and the frequent non-service of warrants are unfavourable symptoms in the working of the Act."

Scientific Officer's Papers.**XXXIV.—"NEW RUBBER-YIELDING PLANTS."**

In the *Bulletin of the Imperial Institute*, Vol. VIII, No. 1, in the course of an article on "New Rubber-yielding Plants in Mexico," reference is made to a number of plants recently discovered by Dr. Olsson-Seffer, among which are certain species of *Plumeria*.

"The *Plumerias* are known as *Cacaloxuchitl* by the natives, and it seems probable that three allied species are included under this name, principally *Plumeria rubra*, but probably also *P. acutifolia* and *P. mexicana*. The plants occur over considerable areas in many parts of Central and Southern Mexico, at elevations of 500 to 7,000 feet, and are found on dry hillsides as well as along creek banks, flourishing best in sandy loam full of rocks and pebbles. The number of wild plants varies from 20 to 175 per acre. The average height is about 12 feet, some specimens attaining over 20 feet, and the circumference ranges from 6 to 18 inches at three feet from the ground. The plants are easily propagated and can be exploited for rubber when three years old.

"The latex, which can be obtained by tapping the stem in the ordinary way, flows principally from November to February. The yield of rubber from the latex varies greatly up to 24 per cent., 14 to 16 per cent. being the average figure. As much as 1 lb. 13 oz. of rubber has been obtained from a single tree by tapping, but usually the yield is much less. It has, however, been found that the young branches are very rich in latex, which contains a fair percentage of rubber, and it is suggested that the best method of exploiting the trees will be to prune them periodically and to extract the rubber from the young shoots by special crushing and maceration processes. Experiments have shown that pruning, if carefully performed, does not injure the tree.

"The rubber obtained from these *Plumerias* is of fair quality. A specimen prepared by direct coagulation of the latex was found to contain 0.75 per cent. of moisture and 13.4 per cent. of resin, whilst a specimen which had been specially purified by chemical methods contained in the practically dry material 3.1 per cent. of resin and 2.2 per cent. of proteid. The rubber as at present produced is rather soft, but it is hoped to improve it by careful preparation. The specially purified material was valued at about 3s. per lb. with fine hard Pará at 4s. per lb."

This is of interest because several members of the *Plumeria* genus occur in Southern India. The common 'Temple' or 'Pagoda Tree,' with fragrant white blossoms is the *Plumeria acutifolia* mentioned by Dr. Olsson-Seffer, and Mr. G. H. Krumbiegel, the Superintendent of the Mysore Government Botanic Gardens, informs me that *Plumeria alba* and *Plumeria rubra*, as well as several hybrids, exist as ornamental flowering shrubs in cultivation.

It would be interesting to experiment with these species, to ascertain whether similar results to those in Mexico, can be obtained from them, and Mr. Krumbiegel kindly promises to tap some of the trees at the Lal-Bagh Gardens in Bangalore. Should any promising results be obtained the subject will be referred to again in the "*Planters' Chronicle*."

RUDOLPH D. ANSTEAD,

Planting Expert.

Notes and Comments by the Scientific Officer.

54. *Felspar*.—A correspondent asks if there is any Felspar anywhere around Coonoor, and if "Gneiss, the rotten rock we have so much of, being almost all Felspar and Silica, and a source of Potash, can be used as a manure?"

I am not sufficiently well acquainted with the Coonoor district to answer the first part of this question, but the Felspars are very common minerals. They are double Silicates of Aluminium with Potash, Soda, or Lime. In Granites and Gneiss the common Felspar is the Potash variety, or Orthoclase. This is one of the chief sources of Potash in the soil; under the influence of weathering, and water charged with Carbonic Acid, it slowly breaks up, and the Potash is removed from it in solution.

In a classic experiment Daubr e caused 6'6 lbs. of fragments of Felspar to revolve in an iron cylinder with 0'66 gallons of water, so that they practically performed a journey of about 3'8 miles, with the result that 6 lbs. of mud were formed, of which a little more than one half an ounce was clay, and in the water there was about one fifth of an ounce of Potash in solution.

Potash Felspar contains from 12 to 17 per cent. of Potash, but as seen from the above it decomposes very slowly indeed. It has been tried as a fertiliser, either ground very finely, or fused with Lime, or Soda, to make the Potash more soluble, but though it has been shown that the Potash can be thus made comparatively available for the plant, the ordinary forms of Potash fertilisers, such as Sulphate, which are completely soluble are much cheaper.

55. *Cover Crops and Wash*.—In the Progress Report on the Pera-deniya Experiment Station from 10th March to 12th May, some interesting figures are published on this subject, which show the advantage to be obtained from a cover crop in the prevention of wash. In the following table, which is taken from the report, the first column shows the cover crop, or soil treatment, and the second column the weight of soil, in pounds, removed by wash during the period covered by the experiment:—

1. Plain deep forking	...	...	1,393½ lbs.
2. Blank	...	...	814 "
3. Dadap stumps	...	...	330 "
4. <i>Crotalaria incana</i>	...	...	309 "
5. Mixed <i>Crotalaria</i> s	...	...	176 "
6. <i>Albizia</i> plants	...	...	168 "
7. <i>Ipomea</i>	...	...	133 "
8. <i>Crotalaria</i> s across slope	...	...	50 "
9. <i>Desmodium triflorum</i>	...	...	30 "

56. *Sprayer for Cattle*.—In Sc. O. Paper XXXIII published in the last number of the '*Planters' Chronicle*' want of space prevented mention of the sprayer recommended for use with the cattle wash. Mr. Cousins recommends an 'Abol' syringe, sold by E. A. White, Ltd., Paddock wood, Kent, England, as being the handiest tool. This costs about Rs.10/8, and is claimed to be, "strong, easily cleaned, and fool proof, even in Jamaica." This latter is a consideration which has to be taken into account in India as well as the west Indies.

RUDOLPH D. ANSTEAD, *Planting Expert*.

DISTRICT PLANTERS' ASSOCIATIONS.**South Travancore Planters' Association.***Minutes of Meeting held at Quilon on June 25th, 1910.*

PRESENT.—Messrs. D. G. Cameron (Chairman), J. S. Valentine, R. Ross, A. W. Leslie, J. Stewart, S. W. Sinclair, W. Ingram, H. W. Heberden, Sherman, L. G. Knight (Honorary Secretary.) *As visitor*:—Mr. J. E. Cameron.

The first business was the election of a delegate to represent this Association at Bangalore. As, from various causes, none of the senior members were able to undertake the journey, no decision was arrived at; but it was afterwards decided that Mr. L. G. Knight should go.

Poonalur Bridge.—The repairs to this bridge having now been completed, the Honorary Secretary was instructed to write to the Ex-Engineer of the district stating that this Association greatly appreciates the promptness shown by him and his subordinates in carrying out the repairs to the Poonalur bridge, once the material was collected at the site, and it is further hoped that the 3 small bridges between Arienkow and Tennali will shortly be taken in hand.

Read letter from Mr. E. Lord resigning his position on the Committee, and Mr. J. C. Parker was elected in his stead.

Planters' Benevolent Fund.—Resolved that the delegate should find out at Bangalore what contributions to this fund are being made by Companies and Estate proprietors of other districts, and that the U. P. A. S. I. should be asked to place subscriptions on a fixed basis.

In addition to the yearly subscriptions promised by each member of this Association to this fund, donations amounting to Rs.410 were promised, Messrs. Cameron & Co., Mr. J. S. Valentine, and Mr. J. Stewart, each putting themselves down for Rs.100.

Elephant Pits.—Read letter from the Conservator of Forests to Mr. E. Lord; it was Resolved that the Honorary Secretary should reply to the Conservator, that as, under the conditions imposed, it was estimated that the capture of an elephant would cost from Rs.500 to Rs.750, and that as only a maximum reward of Rs.100 was offered, this Association regrets that the proposed permission to dig pitfalls would be too expensive to be of use to them.

Mr. Heberden stated that the new road from Shaliacurray Estate to Poonalur, cut entirely at the expense of the estate, was being rendered impassable owing to the heavy traffic over it of Forest contractors' timber carts, in the present wet weather, and in its unmetalled condition. Mr. Heberden stated that any grant of money Government might be good enough to make towards the cost of cutting the road, would be put back into the road in metalling and in building culverts.

Resolved that the Honorary Secretary be instructed to write to the Dewan of Travancore asking if Government would kindly take over this road and make some grant towards the cost of cutting it.

Proposed from the Chair and carried unanimously, that Mr. R. D. Anstead be elected an Honorary Member of this Association.

A vote of thanks to the Chairman closed the meeting.

(Signed) L. G. KNIGHT,
Honorary Secretary.

CORRESPONDENCE.**Crude Oil Emulsion.**

Writing to the Secretary, U. P. A. S. I., under date June 29, 1910, the Ag. Collector of Malabar (Mr. R. B. Wood, I. C. S.) remarks :—

"With reference to the article on Crude Oil Emulsion under "Notes and Comments by a Scientific Officer" on page 261 of "The Planters' Chronicle" dated 18th June 1910, I have the honour to inform you that for plague disinfection we made Kerosine oil emulsion which we find cheaper and quite as effective as crude oil emulsion. Whether it would be equally suitable for Estates, I do not know, but I give the detail of making it below, in case any of your members would like to try it.

'Take four cakes of Sunlight soap, slice them up, add half a gallon of water and boil until all the soap is dissolved. Pour half a gallon of the solution still hot into an open tub tilted to allow the fluid to be beaten up with a cocoanut spoon such as is in general use by natives. Whilst stirring or beating up, add kerosene oil little by little at intervals of about a minute taking care that all trace of free oil is absorbed into the frothy mass before fresh oil is added. After the addition of about three gallons proceed very carefully. If properly done, one half gallon of soap solution should emulsify a whole tin of kerosine containing four gallons. To make one brew of 4 gallons takes about half an hour.'

"For Plague disinfecting purposes we used this emulsion in the proportion of 1 part to 10 parts of water."

Messrs. Shaw, Wallace & Co., Agents at Madras for the Burmah Oil Company, Ltd., have also kindly given the following particulars :—

"The Emulsion is made up as follows :—

"Boil one to two pounds of soft soap (yellow bar soap or the better class of country soap) with one gallon of water until thoroughly dissolved. To this, while still almost boiling, add slowly two gallons of B. O. C. Crude Oil, the whole being thoroughly mixed by energetic stirring. The mixture will then form a creamy mass from which the oil should not separate to any appreciable extent. The mixture should be allowed to cool and should then be made up to 30 gallons by adding water, and can be used as desired after having been thoroughly mixed."

Messrs. Shaw, Wallace and Co. writes :—

"This Emulsion as an insecticide has received the approval and recommendation of Mr. Maxwell Lefroy, the Government Entomologist and if you would care to give same a personal test we shall be pleased to supply you with the Crude oil required.

"We understand 150 gallons of the above mixture is sufficient for 11 planted acres."

Note by the Scientific Officer.

The above letters were laid before the Scientific Officer, who comments thus :—

The recipe for making Kerosene Emulsion given in Mr. Wood's letter will be found a most useful one. It requires time and careful making, as if too much kerosene is added at a time, the oil separates out instead of emulsifying. Crude Oil Emulsion was recommended by Mr. Lefroy, the Imperial Entomologist, (See "*P. C.*," Vol. V, p. 67) and he points out that, though kerosene is a valuable insecticide, "the heavier unrefined oils have a greater and more persistent effect, and are both economical and effective."

If in the recipe given above, crude oil is used in place of kerosene it will be found that an emulsion cannot be made. In fact such emulsions need a special process. I have no doubt that the recipe given by Messrs. Shaw, Wallace & Co. will produce an emulsion containing a certain amount of oil, but the Emulsion recommended by the Imperial Entomologist contains 80% of Crude Oil, and 20% of Whale Oil Soap. It is already made and needs only to be mixed with cold water in the proportion of $\frac{1}{2}$ -pint to 4 gallons, and so does not need the careful supervision while being prepared that is required when emulsions are made from the beginning. In many cases no doubt, Kerosene emulsion, or a crude oil emulsion, made by the methods so kindly described by our correspondents will serve the purpose just as well as Lefroy's "Crude Oil Emulsion."—R. D. A.

Green Bug In Coffee.

In the *Madras Mail* of June 27 a letter from Mr. A. G. Nicholson, of Coonoor, appeared. Mr. Nicholson stated therein :—

"In connection with a letter which appeared a day or two ago in your paper on the above subject, I wish to state that the brushing solution quoted therein may be altered with advantage by substituting 1 lb. refined saltpetre for the 1 lb. crude saltpetre, which allows the expensive rosin to be omitted if the lather is properly made. Mr. Brown takes exception to coir brushes, so have ordered one of estate make to be sent to him to show that his were not properly made. They must be 3 to 3½ inches in diameter, or it is impossible to get a proper lather of the right consistency. A brush made properly of new fibre will last more than six months, and it is quite impossible to injure either foliage or berries with such a brush. Without a large soft brush, lather of the right consistency cannot be made. Such a lather should be more like a thick cream or paste than lather, so that it clings to the bug and everything it touches. If not worked up sufficiently the water separates from the lather and gets between it and the leaf, so that the lather slides off. If the lather is properly made, not a bug lives that it touches, and all are dead in 6 to 8 hours. With insufficiently worked lather some escape and the rest take sometimes as long as three days to die. Before brushing the bug, the lather should be worked up in the left hand, with the brush held in the right, till it is of the proper consistency, and until there is a mass of lather, at least the size of a large orange; it requires several minutes to do this and a good deal of practice. I have this week been over three estates on these Hills, which last year seemed hopelessly bad with bug, which have been steadily brushed from the beginning of January, and I am pleased to say are now practically free from bug, though the bug has been just as active as ever. Spraying Mr. Brown will find both expensive and ineffectual; expensive because it requires about two gallons to spray one fair-sized tree, and ineffectual because the cooly is what he is. I am willing, however, to sell Mr. Brown or anybody else a number of unused 'Deeming Success Sprayers' at the price they cost me to import direct from America. For large brushes I recommend 8 ins. galvanised buckets at Rs. 4-4 per dozen, from Messrs. Peirce, Leslie and Co., Calicut."

Apropos of this, we publish the following letter :—

I have read Mr. Nicholson's letter on this matter of such supreme importance, just now, to a large body of people, with interest. I am very glad we have some information, first hand, from the gentleman to whose untiring perseverance we owe the hope of growing Coffee in face of this pest. The brush sent to me is very good indeed and better far than those my coolies did the work with, which, however, were large enough and gave a fine lather. I insisted on the lather being produced, and I have a splendid-looking field

of Coffee as the result of the brush work. If face of the possibilities (at no prohibitive cost) it is sad to see Coffee being rooted up; (I am using stumps for my Dryer purchased from a Coffee Estate) while on large Estates of some 300 acres the crop is only from 3 to 15 tons for the coming season!

I must however take exception to the statement made by Mr. Nicholson that it will take "2 gallons to spray a fair sized tree." I find that the figures I published will need considerable qualification by the side of facts as revealed by days of spraying. Here are the results as carefully noted and reported:—

3,169 trees sprayed by one "Eclair" sprayer at cost of Rs.7-1-11 for all labour inclusive from 6th to 29th June (24 days.) No work was done on Sundays so the actual number of days is less. Material used 127½ lbs. of each of Soda, Rosin and Soap. Cost is as reported at As. 1 and As.2 per lb. Rs.31-14-0. or say about Rs.12 per acre per spraying, against my corrected figure of Rs.20 for 3 *spraying*s.

Here we have, vide my published figures, 127½ x 4 or 510 gallons for say 3 acres; or 170 gallons per thousand trees, or 1'86 *pints* per tree. This however is double what it should be with a good Nozzle I think, and is for very bad cases, neglected for long. The trees, however, from shade and manuring and partial brushing work are large.

Now I feel pretty sure that with the brushing, *as we did it*, the cost would have been for Material Rs.5 only; but Labour Rs.30.

The fact that Planters have gone in for Brushing, in either a desultory manner (as did myself) or not at all, speaks for itself. It may be that there is still much to learn of the correct manner of applying, so as to bring down the cost. This Planters must watch, and it is sincerely to be hoped results will be published, not in any carping mood, but with an earnest desire to help.

I have to state that to-day, weeks after Spraying and Brushing, the latter is showing cleaner trees, and Planters must be careful about deciding what they will pin their faith to.

THOMAS BROWN.

Coonoor, 30th June, 1910.

N.B.—Copies of these letters will be sent to anybody sending me annas 2 per copy in postage stamps.—T. B.

FORTNIGHTLY RUBBER AUCTION SALES FOR COLOMBO.

The Ceylon Observer remarks:—"We are glad to hear that the move which we have for some time past been advocating, and brought forward again so recently as the 9th instant, is now at last being seriously considered—namely, the institution of periodical Rubber auctions in Colombo, similar to the weekly tea sales; but these Rubber sales are to be held fortnightly at first. The various Colombo Estate Agencies have been approached as to whether they would support such a sale with offerings of the rubber under their control; and they are, we understand, practically unanimous in favour of the new departure. The sales will not, however, commence—we presume—before August at the earliest; and most probably not till the new Broking Rules, which still await Chamber of Commerce approval, also come into force."

SISAL HEMP IN FORMOSA.

In the South, near Ako and Koshun, the conditions are recognised as being peculiarly favourable for the planting of sisal hemp and the Manufacture of fibre and Manila rope. A proposal is said to be on foot, backed by four or five large capitalists in Japan, for forming a company with a capital of 2,000,000 yen (£204,160) for this purpose. The proposed site of the factory is not far from Ariko, near which place an area of about 15,000 acres of suitable, uncultivated land is said to be available for planting sisal hemp.

RUBBER.

Rubber Plantations in Malay.

For the following account of the rubber industry in the Malay Peninsula we are indebted to a recent report of the American Consul-General at Singapore:—

In 1908, 250,000 acres of rubber culture existed in the Malay Peninsula, 180,000 acres in Ceylon, and about 150,000 acres in Java, Borneo, Sumatra, India, Burma, and New Guinea. This gives an acreage of 580,000, largely new planting, which has been increased in 1909 to at least 600,000 acres. If this acreage yields by 1915, 300 lbs. to the acre there will be a rubber production that year from the countries named of 180,000,000 lbs. which is several millions more than the present output of the world, and if the present rubber prices—\$2'25 per lb—should decline to \$1, the yield would still bring \$180,000,000. Such figures are startling, and yet many close observers believe that by 1915 the world's yield of plantation rubber will be at least 450,000,000 lbs. The Malay Peninsula is still a vast jungle. A railroad penetrates it, running North and South for about 500 miles; and there are 1,710 miles of metal roads, which have been largely constructed under the advice of the British Residents, whose influence for nearly 100 years has been exercised in a most beneficent manner over the peninsula. Some of these vast jungle lands have been cultivated in spots in which are grown cocoanuts, gambier, coffee, pepper, pine-apples, spices, and rice, but the greater part are still untouched. Thus this large territory, which seems especially adapted to rubber culture, will, when cleared, have the advantage of a rich virgin soil, which, by every experiment so far made, has proven well fitted for a quick and sound growth of the Pará rubber plants. The investments in rubber plantations on the Peninsula amount to \$50,000,000, and every week new land is taken and valuable concessions granted. It is believed that the prosperity of the Federated Malay States will be greatly accelerated by the rubber estates . . .

The official report of the Malayan Peninsula for 1909 shows that the rubber estates have a total of 762,408 acres, of which about 250,000 acres are planted, 60,500 trees being planted in 1908. Government land at present can be acquired only by lease, paying a premium of \$1'75 per acre and an annual rental of 57 cents per acre. The other expenses are about as follows per acre: Clearing jungle, \$8; Surveying, 57 cents; lining, holing, weeding, \$5 to \$9; other expenses, \$8 to \$15; total, from \$29'57 to \$40'57. The labour is largely Chinese or Tamil. Experience in planting proves that Pará rubber plants are the best, and many estates that have been experimenting with other species, such as Castilloa and Dyera, are now removing these plants and substituting the Pará, which produces better rubber and is more easily cultivated. The seeds, three or four in a fruit, germinate in three to four days after planting. The seedlings are usually transplanted into a transplant bed, and after several weeks are set out from 15 to 17 feet apart. The closer the plants the sooner they give large yields, but if planted at least 17 feet apart they yield on an average more later. Here-to-fore clean weeding has caused an annual outlay of about \$16 per acre but experience has shown that under-planting with some leguminous plant does away with the necessity of clean weeding, and keeps the ground in better condition as to fertility and erosion, and the initial outlay is only \$4 to \$5 per acre. Planters are now tapping three-year trees, which may prove a mistake, as five-year trees can best stand the first tapping. The herringbone tap and the open V are the most successful tapping systems used. The best system is to tap every day for three or four months, then rest the tree for two months.

SELECTED CUTTINGS.**The Outbreak of Blister-Blight on Tea in the Darjeeling District in 1908-1909.**

MR. W. McRae, M. A., B. Sc., Offg. Imperial Mycologist, writes in the *Agric. Journal of India*, April 1910 :—

In June 1908, near the head waters of the Balasan River, leaves of the tea plant were observed to be attacked by Blister-Blight. Gradually the blight spread from garden to garden, and in October it was noticed on gardens on the Tukvar slopes. This was the first appearance of blister-blight in the district of Darjeeling. The disease is not a new one on the tea plant, but hitherto it has been confined to the Brahmaputra Valley in Upper Assam, where it was investigated and described by Sir G. Watt in 1895. It has existed in that region for over 40 years. These two places are widely separated, yet the blight has not been reported from any of the intervening tea districts of Cachar, Sylhet or the Duars. In this year it did not do much damage and in the cold weather died down.

In 1909 the blight appeared again but earlier in the season, *viz* : in March. During the summer it showed for the first time on other gardens. Everywhere it spread rapidly till hardly a garden in this part of the district is now free from blight.

The first indication of a blister is a small, pale green, yellow, or pinkish translucent spot easily seen against the darker green of the rest of the leaf when it is held up to the light. Sometimes the pinkish tinge fades or it may never be discernible. In other cases the spot is deep red on both sides like red ink, and the red tinge remains even when the spores are ripe. The circular spot enlarges, usually reaching a diameter of $\frac{1}{4}$ to $\frac{1}{2}$ inch. On the upper side of the leaf the spot gradually becomes depressed into a shallow cavity and on the under side it bulges out slightly, thus forming the blister from which the blight takes its name (Plate XI, figs. 2 and 3). The upper concave circular area is smooth and shining and the colour is usually paler than the rest of the leaf. The under convex surface, on the other hand, is dull and at first is grey as if dusted with white powder but when mature it becomes pure white. The lower surface produces colourless spores with the outgrowth of fungus filaments give the white appearance to the under side of the blister and on some vigorously growing blisters slightly to the upper side also. In not a few cases the form of blister is reversed and both forms may be found on the same leaf; but the spore-bearing surface is always principally on the under side of the leaf. After a time the white blister becomes discoloured till it is dark brown or black, then it becomes dry and shrinks till the discoloured patch is in the same plane as the rest of the leaf.

After the leaves of a bush have been attacked the disease spreads to the leaf-stalks and the young, succulent, green stems, but here the appearance of the disease is not so conspicuous though the damage is much more serious. The course of the disease on the young delicate stem is like that on the leaf only no blister is formed. The colour of the spot is very similar, but the deep red tinge is wanting. The spot becomes elongated and also gradually spreads round the stem. At this place the stem becomes slightly swollen. When the spores are ripe they give a grey appearance to the spot but it does not become pure white like the blister. The disease eats through and the leaves and buds on the green stem above wither and blacken while the stem bends over and falls off at the diseased part. Several of these dead twigs on a bush give it a black, unsightly appearance.

When a thin section of a blister is looked at under the microscope fine colourless threads (hyphae) of the fungus are seen between the cells of the leaf. These come to the surface on the white side of the blister and produce spores at their ends. There are two kinds of spores. The first is two-celled and is produced at the end of a long stalk. The second kind is one-celled and is produced on a very short, thin stalk from the swollen end of a hyphae. In the latter case spores are always produced in pairs.

When kept in a moist chamber on a slip of glass or on the surface of a fresh tea leaf the spores swell slightly and germinate within $5\frac{1}{2}$ hours of being sown: From each of the cells of a two-celled spore or from the one-celled spore a thin tube grows out, increases in length and enters the leaf by a breathing-pore. When inside it branches freely and gets its nourishment from the cells of the leaf. After a period of eleven days the translucent spot is clearly visible and in from six to eight days more the blister is formed and the hyphae produce spores.

If a blister is situated on the midrib, the leaf often folds or rolls upon itself irregularly, sometimes the lower and sometimes the upper surface of the leaf remaining outermost. If several blisters occur near the margin the leaf often becomes curled and twisted on the most fantastic manner. The number of blisters on a leaf varies from one up to about twenty, and they may be isolated or several may run together to form a large patch with an irregular outline. To such an extent does this sometimes go that the whole under surface of the leaf may be covered with an even mass of blisters.

When many of the leaves on a bush have even only a few blisters each, the damage done to the bush in reducing its green surface available for food-making is great and in addition the parasite is draining the host bush of the nourishment made for it by healthy leaf tissue. When the vitality of the growth is lowered the healthy flushing of the young leaves and buds is retarded causing considerable loss. When the disease runs unchecked through a bush and the young shoots have fallen over and decayed it has a black, unsightly appearance quite justifying the anxiety of the managers on those gardens where the disease is prevalent.

The exact place in the district where the disease first occurred cannot now be settled with certainty, but it was most probably on the slopes on the southern side of the Senchal ridge. Last year it was noticed at several places near the head waters of the Balasan River almost simultaneously. After it had once been reported it was found on quite a number of gardens. From this it may be conjectured that the rate of dissemination of the disease was very rapid or that it may have existed in the gardens for some time without having been noticed. This last may quite well have occurred in gardens where it was doing little real damage especially as the disease was new to the district and was then unknown to many planters. From observations made this year the former also seems to be the case, and when once the blisters have matured the spores, which they produced, quickly become distributed.

When blister-blight appears on a block scattered bushes are affected, some badly and others slightly. Only one or two leaves on a bush or a few more or a great many are blistered. A block may appear quite healthy till suddenly a few blistered leaves will be seen, and this occurs in a noticeable way when a spell of wet weather recurs after a few days' sunshine. Little damage may be done or the blight may become worse and worse, both mature leaves and flushing shoots becoming affected, then blackening and dying till leaf-picking is stopped.

The spores of the parasite are distributed by the wind and the quick distribution can be understood when one remembers the fairly strong breezes

that occur here. On days in which there are a few hours of dry weather or sunshine, the wind will blow the light dry powdery spores about, and they may be borne a considerable way and scattered over a comparatively wide area. In the Balasan Valley strong breezes blow up the valley, especially in the evening of a hot day, and the blight has travelled much more rapidly and in more severe towards the head waters than downwards towards the plains. In this valley the disease is severe on slopes exposed to the wind, *i.e.*, on southern slopes. On the Tukvar side of Senchal the winds are not so steady and are more irregular in direction, and here the distribution of the disease is erratic.

The blight attacks the high quality Assam and hybrid jâts most severely, while China and Manipuri are not so much affected. It is quite interesting to see, in some China blocks where Assam or hybrid bushes have been used to reset empty places, how the leaves of the two high quality jâts are well infected with blister whereas the leaves of the China are almost free. Yet in some gardens China is very badly affected and the bushes have a woeful white or black appearance according to the stage of the disease.

With respect to heavy pruned, lightly pruned and unpruned tea it is difficult to say definitely that one is attacked more often than another but, when once the blight has come, the damage done is in the order of mention. In the young, succulent rapidly-growing leaves of heavy pruned tea the blight develops vigorously and may destroy nearly all the leaves that ought to go to form growth leaves. Now for a good framework of new wood a heavy pruned bush depends mainly on the growth made in the first year after heavy pruning. If then in the first season much damage is done to the leaves growth is checked, thus causing serious loss in crop in the following season.

The blight is worse on places with a high rainfall and worst about that elevation where rain falls nearly every day and mists are constantly hanging about. Thus on the slopes of the Rungbang and Balasan Valleys facing the plains the blight is on the whole worse than on the Darjeeling side of Senchal. The blight seems to be more severe at high elevation and worst between 4,000 and 5,500 feet. Not elevation, however, but moisture is the real factor with regard to severity. In this district high elevation means, within certain limits, high and evenly distributed rainfall. The three worst blocks and the only extremely bad cases on a large area seen by me were on gardens between 5,000 and 5,500 feet. Whereas in a low elevation garden in the Rangit Valley, the blight came late in the season of 1909 and was only very slight; one had to search to get blistered leaves. Too much shade whether artificial from planted trees or from proximity to jungle favours the blight and it is worse too on damp, shady hollows. It was found that the bushes under the trees grown for shade in the garden were often affected when the surrounding unshaded bushes were free from blight, and when both were affected the shaded bushes were more severely blistered. This occurred under old trees that were giving more shade than was really necessary, and suggests the thinning of jungle trees near the tea and lopping off branches where shade-trees have become too dense.

The amount of damage done by blister-blight this season is difficult to gauge. Fortunately for the industry weather conditions were favourable from April to June and gardens flushed well, getting thus well ahead of their usual average. They have, however, since gone down and some gardens are well behind. The greater loss is attributable to wet, unfavourable weather in July and August and a considerable portion to blister-blight. The worst damaged piece of tea was a heavy pruned block. Ninety per cent. of the plants had lost all their leaves or the leaves were all blistered. As soon

as a bud sent forth a leaf it was attacked. The year's growth had failed, and most of the bushes will start next spring as if they had been just pruned unless, as is more likely, they start weakened by the lack of growth this season. In new-extension young plants often suffer badly (see Plate X, figs. 4 and 5). In one seed bed, all the seedlings were destroyed by blister-blight, and as the cost of the seed and of upkeep amounted to Rs.770, this was a dead loss. On Dooteriah Division in the two seasons over 900 maunds of blistered leaves were picked and destroyed of which about one-sixth might have been made into tea, the remainder being mature leaf. The cost of collecting this amount of blistered leaf was Rs.657. At Tukvar the loss this year is about 30 maunds of tea. These are average examples of loss, but some gardens have lost much more and others much less. No account has been taken of the damage due to lowering of tone and weakening of the bushes.

How the blight came to the tea plant in this district is not definitely known. It may have been imported into this district from Assam or have come from the jungle. Every year small quantities of seed are imported into Darjeeling district and very probably from Dibrugarh and the surrounding tea area where some of the best tea-seed is grown. It is possible that the blight may have been introduced with the seed or the earth in which it is usually packed. Though many spotted leaves from weeds and trees among the tea bushes and on the edge of the jungle were examined none were found to have been caused by the same fungus (*Exobasidium vexans*) as causes blister-blight on tea. On Kharani (*Symplocos Theaefolia*) a very similar blister occurs, caused by an *Exobasidium* nearly related to that on tea. There are microscopic differences between the two fungi and probably they are different species. Preliminary inoculations made to see if spores from the Kharani blister would attack tea were not successful.

Methods that have been tried for keeping the disease in check resolve themselves into (1) picking of diseased material, (2) pruning, and (3) spraying with fungicides. The first and second aim at lessening the spread of the disease by removing, and destroying the material containing the spores of the parasite which cause new infection. The third aims at killing the fungus and at preventing the growth of spores that may fall on the sprayed leaves.

On Dooteriah Division ever since the blight was first seen the Manager had the blistered leaves picked off and destroyed, and it was hoped that this would have been enough to keep the disease in check. The coolies who picked the blistered leaves were not allowed to pick leaf for tea and the baskets were kept separate. The diseased leaf was burned in the factory furnace when the coolies happened to be within reach, otherwise it was buried in trenches. This saved the risk of infection while the baskets were being carried long distances through the tea or sent down the wire rope. The tea near these trenches did not become more affected by the blight than that anywhere else. In all 620 maunds of blistered leaves were destroyed this season, yet in September the blight spread more rapidly than it could be dealt with and got beyond the available labour for treating it in this way. Thus though the blight was kept in check for a time the result was not satisfactory.

The Manager of Pussimbing tried to check the blight by close picking. All blistered leaves, young shoots and sprouting buds were removed whether affected with blister-blight or not, and then the coolies got round the garden once every eight to ten days. They took a bud and two leaves as usual but removed most of the third leaf as well. The idea was to take all the

leaves on which the blight grows before it had time to bring its new spores to maturity. By thus continually preventing the production of spores, it was hoped that, after a time the young shoots would grow up free from blight. So far as the absence of blister-blight is concerned, the result on Pussimbing and especially on Pubong was very satisfactory. In July blight was prevalent on both gardens and severe on the part of the latter, but by the middle of September there was not much blight on either.

The drawback planters urge against this method is that it takes a strong labour force to pick over a garden in the time and in most gardens in the Darjeeling district at the present time this is said not to be available in the busy season. If a garden was in vigorous health and flushing well, it could not be overtaken in time, for even with the ordinary way of picking it is sometimes difficult to get round. Then, again, this method of close picking is practicable only in the latter part of the season after good growth has been made in the earlier part of the year, but would be dangerous after a period of unfavourable growth at the opening of the growing season. Some modification in the style of leaf-picking along the lines of this method seems, however, the most likely way of dealing with the blight in the rains, and the details will have to be worked out by a practical man on the infected gardens.

Spraying.—It was demonstrated at Tukvar in a number of small experiments that spraying with Bordeaux Mixture kills the spores and filaments of the fungus where the liquid comes in contact with them. It also does much good on young green twigs affected with blight. In the usual course of the disease when a twig becomes "blistered" the swelling extends gradually round and through the twig, and ultimately causes the part above the spot to succumb. If, however, it is sprayed before the spot has extended much, then the Bordeaux Mixture kills the fungus and the shoot recovers. This in itself is a great advantage as it saves the buds in the axils of the leaves above the affected spot to produce leaf for tea. The mixture on the leaves also prevents spores that fall on them from developing.

As spore-formation usually and infection invariably takes place on the under-surface of the leaf, this is the side that must be sprayed. That accordingly makes spraying difficult as the tea bushes are very dense. Spraying on tea gardens situated as they are on steep slopes of hill sides is an arduous task. The chief difficulties in the way are due to heavy rainfall and to the difficulty of transporting water for preparing the fungicide. During the time when blister-blight is spreading the heavy and frequent showers wash off any liquid sprayed on the leaves, and especially on the high gardens, about the mist-zone where it is often continuously wet for days together. The fungicide does not always remain long enough on the leaves to prevent incipient blisters from maturing. It has no effect on new shoots that develop after the application, and they are just as ready to be infected and spraying must be repeated for their benefit. General spraying in the rains is impracticable, but on heavy pruning, new-extension and seed-beds, where the area is small and the blight might cause heavy loss, the labour and expense of repeated spraying would be well repaid by the saving of the plants. At Tukvar a small block of heavy pruning became well blighted in June and July. It was sprayed with Bordeaux Mixture five times, and in September looked very well, though it never became quite free from blight; a few blisters could be found here and there. The bushes were all healthy and had made good growth. The Manager was well satisfied that the result was worth the effort made. Spraying in such cases, to do good, must be repeated; once only is not enough. Buds that open after the bush

has been sprayed are unprotected by the fungicide, and are liable to fresh infection and have to be covered with fungicide.

Pruning.—It is on pruning that reliance will have to be placed in combating blister-blight during the cold weather. For this one cold weather all bushes should be pruned, in the ordinary way back to the last one or two buds and the lower as well as the upper parts of the bush should receive attention. All prunings or at any rate all from affected areas should be burned or buried, and with careful cultivation following, all the fallen leaves and twigs will be turned in and rendered harmless. Prunings ought by no means to be left on the ground nor is it sufficient, simply to turn them in during cultivation.

As it is possible and very probable that unpruned tea carries over the blight from the end of one season to the beginning of the next, it is strongly to be recommended that this cold weather no tea be left unpruned. Heavy pruned tea suffers severely, and whether the leaves are picked off or left blistered on the bush an attack often means disaster. As little as possible heavy pruning should be done this autumn, and when it must be done care should be exercised in selecting a plot that it is not very near one that was badly affected. It is necessary that every one should adopt the measures as one neglected garden may infect a whole neighbourhood.

At the beginning of the season of 1910, a careful look-out should be kept for the first appearance of blister-blight and whenever seen the blistered leaves should be destroyed and the surrounding bushes should be sprayed thoroughly with Bordeaux Mixture, and after a day or two a man should be sent round to pick any leaves with fresh blisters that may have escaped treatment. Continue the treatment till the early rains come.

Recommendations for the cold weather of 1909-1910.

It would be desirable

to prune all bushes in the garden. The pruners should open up the bushes and remove all growth-leaf showing traces of having been blistered.

to leave no unpruned tea anywhere on the garden and to do no top-pruning (skiffing).

to do heavy pruning with caution and to restrict the area as far as possible. It should be done comparatively early to get some growth in spring before the blight may appear.

to burn prunings or to bury them in trenches under at least 1½ foot of earth.

to have a responsible assistant go carefully over every block to see that no infected stems or leaves are left on the bushes or exposed on the ground.

to begin pruning early in the cold weather and to cultivate soon afterwards, in order that any blighted leaves or twigs on the ground may be forked in.

Every Gardeu in the whole district should be pruned. Success in exterminating the blight depends on whole-hearted co-operation.

If blister-blight should appear in March pick off blistered leaves at once and spray the surrounding bushes. This may be done till the early rains come.

In seed-beds, new-extension and heavy pruning, where the damage from blister-blight is considerable, be prepared to expend money on repeated application of blight-remedies because the benefit in each case would more than pay for the cost of treatment.

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JULY 16, 1910.

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(INCORPORATED.)

Agri-Horticultural Show at Singapore.

A letter from the Honorary General Secretary, Agri-Horticultural Show, Singapore, states :—

"An Agri-Horticultural Show will be held in Singapore on August 17th, 18th, 19th and 20th, 1910, as per prize list sent herewith, and the Rubber and Machinery sections will be very well represented and interesting to planters, who are expected to come here in large numbers from Malaya and the surrounding countries. It has therefore been thought that rubber planters from Southern India might also be interested in this Exhibition and that, as communication between us is regular and rapid, they might either come themselves or send some of their rubber for exhibition. A large building very suitable for the purpose has been set apart for the rubber section of the Show which will be under the care of a well-known expert, and exhibits might either be returned or sold locally, as arranged by exhibitors.

"As time and space, however, are limited, and similar letters are being sent to Ceylon, Java, Borneo, Indo-China, etc., we desire to limit the exhibits from each country to six in number, each exhibit of any kind of rubber to weigh a minimum of 50 pounds and, in order that no doubt may be raised as to the authenticity of such exhibits, we request the Planters' Association or any equivalent representative body in each country to select the exhibits sent and to certify their origin, manufacture and ownership. Two cups of the value of \$100 each have been offered for the two best exhibits sent from countries outside Malaya, and it is possible that other rewards may be awarded.

"No entrance fee will be charged. The official certificates required will form the official record of the entries sent, and arrangements could no doubt be made with or through the Agents of the British India Company as to freight, insurance and other particulars."

In a later letter it is explained that the samples of rubber from Southern India "are for exhibition purposes only and not for competition with exhibits from the Colony and the Federated Malay States." It is stated also—"The two cups offered have not yet been accepted, as we have to obtain the sanction of the Governing Committee, who have been communicated with on the subject."

"The Planters' Chronicle."

Any planters who have copies which they do not want of any of the issues from February to August 1909 would confer a great favour on the Editor if they would kindly return such copies to him—postage "bearing." Orders for bound volumes come in from time to time, and it is matter for regret when they have to be refused for want of stock.

Scientific Officer's Papers.**XXXV.—CASTILLOA RUBBER.**

The Agricultural Society of Jamaica have for several years been in correspondence with rubber growers in various parts of the West, and in their Bulletin for May publish a number of letters on the subject of Castilloa. Though in Southern India we are chiefly interested in Pará and Ceará Rubber, there are many acres of Castilloa, which have on the whole proved a disappointment, I think, and the following extracts from these letters may not only be of interest to some planters, but may help to show how the existing Castilloa can be made more satisfactory.

Mr. H. G. Carvalho thinks that one reason for the unsatisfactory results obtained from Castilloa is due to insufficient care in the selection of the seed. He writes:—

“There are several varieties of Castilloa. The *Castilloa elastica* is the best rubber yielder of the species, the others are more or less hybrids, descending in the scale from the 4-16 lbs. yields per tree of the *elastica*, to the almost nil of the *C. Australis*.

“From my observations, Castilloa rubber will grow and yield equally well on almost any soil, from the rich alluvial of the bottom lands to the loose rocky soil of the hills, as long as it is free draining; but it absolutely refuses to thrive in wet, undrained, clay land. On the other hand, it cannot have too much running water near its roots. Trees growing near streams will give great quantities of latex, other conditions being favourable. It requires a warm, humid climate, and an evenly distributed rainfall, the shorter the dry season the better is the locality adapted for rubber growing. From personal observations I have come to the conclusion that *Castilloa elastica* will never give its greatest yield when grown as an orchard tree. It is essentially a forest-loving tree. Take its life history from the moment the seeds fall from the parent tree until it reaches its maturity, and it will be seen that to yield its best it must have its conditions only obtainable in a forest. The seeds are very thin shelled and lose their generative power quickly, and unless they fall on cool, moist soil so as to enable them to sprout quickly, they will die. The younger trees are very brittle and easily broken by wind, they must, therefore, have the protection of other trees to shelter them until they are strong enough to fight for themselves. Though in forests densely shaded they take a long time to develop, and even then are inclined to be spindly, yet the yield of rubber given by these trees, is five or six times greater than the yield given by trees three times the size, growing in more open situations. The trunk and roots of the tree require to be shaded and kept very moist for the latex cells to arrive at their full development, and for the tree to provide the maximum of latex. What use is the latex to the tree, I leave scientists to discover. What I do know is, that under these conditions, the tree yields its best. There is a prevalent idea that the Castilloa thrives best in an open situation, where it can get plenty of air and light. This is quite right, and if it were grown for the weight of wood that condition would be best, but unfortunately it is grown for the yield of latex, and we must sacrifice even the fine appearance of the tree to procure what we want.

“We now come to one of the, if not the most important, points in Castilloa rubber growing, *viz.*, the selection of seed. Too much stress cannot be placed on the importance of getting the seed of *Castilloa elastica* Cerv., from the most responsible parties, who will guarantee that they are gathered from the best, and only the best, latex producing trees, *i.e.*, trees that have recently yielded not less than 4 lbs. dry rubber. It pays a

planter to exercise this care, considering he has to wait eight to ten years before he knows if he has planted *C. elastica* Cerv., or *C. Australis*, something else. Thousands of pounds have been lost through this lack of care, with the result that *Castilloa elastica*, through no fault of its own, has been condemned as a failure. Hundreds of planters are to-day sore at heart from their dire experiences, and the fiat has gone forth to the world that the man who takes up *Castilloa* rubber growing is only qualifying for Colney Hatch. And all this solely from the lack of experience and necessary care in the selection of seed. When the seeds arrive a further selection must be made to determine the best to be planted. This is easily done by throwing them into a vessel of water, and rejecting all those that float—the quicker they sink, the better the seed."

Mr. J. C. Harvey, a Mexican planter, thinks that seed selection is difficult. He gives an interesting account of the way the latex is coagulated and the rubber handled in Mexico, and it is interesting to note that the latex there is not allowed to come into contact with metal of any sort.

"I have read a good deal about the varietal differences occurring in the genus *Castilloa* as found in the countries south of Mexico. Here, at least, on the Gulf side, we do not distinguish varietal forms to any extent. All the *Castilloa* occurring here in a state of nature gives a fair amount of latex. Undeniably, however, there are constitutional differences in the tree, some trees producing a viscous latex while other produce a thinner fluid, resulting in better rubber,—that is to say, a rubber containing a higher percentage of caoutchouc and a lower percentage of resinous substances. (Other phenomena have been observed, as, for instance, that trees which, at six years of age, produce a fairly good merchantable rubber, having an acceptable degree of elasticity and resilience, cannot be depended upon as the outcome of any certain batch of seed, because the rubber given by other trees raised from the same has been found to be lacking in such qualities, proving, indeed, distinctly 'tacky,' and breaking under a comparatively light stress. Another development manifests itself later, *viz.*, that the six-year old tree producing the 'tacky' rubber becomes improved under subsequent tappings, until at the age of, perhaps, ten years it is yielding a rubber as good as the other tree. As far as we have got along with this problem, however, it has not seemed possible to distinguish accordingly in the selection of the seed in the first instance; and for my part, I am disposed to the belief that these differences are purely constitutional ones, inherent in the seedlings, though the plants be all raised from the seed of *one* individual. How seed selection may most advantageously be carried out in actual planting practice, in view of the period set by nature before results can be available, is, therefore, a problem essentially of *time*. No doubt, further light might be thrown upon the subject under the auspices of government experimental institutions, but in the case of the planter the time element is obviously prohibitive. The best that he can aim at is to collect his seed from trees known to be good yielders, run the seed through a sieve, rejecting under-sized ones, and plant the rest,—at least *ten* seeds to the stake; finally, upon the expiration of some months, removing all but the strongest plant. He is thus assured of, at least, initial individual vigour, and it would be natural enough to expect that on an estate so planted there would be a fair average resultant yield from the trees.

"The product of the tappings of each day is treated, in the following manner: the latex, as it is brought in from the field in the evening, is all mixed together, to insure uniformity; passed through a strainer of wire mesh, to free it from mechanical impurities, such as chips, bits of bark, lichen, etc.—

about ten per cent. of water being added, if it should be too thick to run easily. The latex so strained is next placed in wooden tanks, or barrels, avoiding all contact with metals of any kind. To fifty gallons (or any other convenient unit) of the latex four volumes of water are added, and the whole well stirred. The tanks, or barrels, are then covered to keep out insects or what not during the night. The following morning the latex will be found to have risen to the surface in the form of cream. (I should have mentioned that the barrels are provided with a faucet at the bottom to admit of the separated black water being drawn off from below into a recovery tank, in case there should be any doubt about any small percentage of residual latex being contained in the black water). The black water being thus removed, the remaining latex cream is then transferred to a coagulating vessel, which for convenience on a small scale may be a tank of wood three or four feet in length, about fourteen inches in width, and eight or ten inches in depth. Such a tank will coagulate a slab of rubber in the spongy state weighing perhaps twenty-five or thirty pounds. We use to every five gallons of latex two and one half kilos of the juice of the macerated stems of the large white-flowered *Ipomoea* (I think, *I. bona-nox*, syn. *Calonyction grandiflora*).

"In preparing this coagulating medium, we macerate the stems of the plant, diluting the juice with a quart or two of water, and straining it afterwards to remove the fibre, incorporating it thoroughly with the latex. Coagulation takes place in from half an hour to an hour, when the spongy mass can be lifted out of the tank, cut into strips of regular size, and passed back and forth between the rubber rollers of an ordinary clothes wringer. One man can put up fifty pounds of first class rubber in this way per diem. The strips are then hung upon bamboo rods in a cool house, from which the light is excluded; and in ten days or a fortnight the rubber is ready for shipment."

The plant here mentioned as supplying the juice used for a coagulant (*Ipomoea bona-nox*) is a 'Convolvulus' with a white flower which opens in the evening. It is often seen growing in compounds in Bangalore, and elsewhere, but I do not know if it occurs in a wild state.

Mr. Harvey continues:—"On the Pacific coast, near the Guatemalan frontier, some of the rubber planting companies state in their literature (?) that the *Castilloa* grown by them is an entirely distinct species, their authority being Mr. O. F. Cook, of the U. S. A. Department of Agriculture, Washington. I understand that he has set up a new species, and calls the Pacific coast form *Castilloa lactiflua*. Some two years ago I procured some of the seed of these trees, and I now have several thousand plants growing on my estate, these being from six to ten feet high at the present time. So far, I can detect no difference whatever between these and our local plants. But when the former flower and fruit (probably about the fourth year), we shall have the material upon which Mr. Cook founded his species. Meanwhile, I have no further observations to make regarding it. I would not wish it to be inferred from anything that I have said in the foregoing that we do not recognise the possibilities of improved devices and methods in the treatment of *Castilloa* rubber. One or two of the larger companies have already, in fact, installed centrifugal and cropping machines for their output; but in the case of any modest estate, and especially having regard to the fact that we have not got very far along in all that there is to be learned about *Castilloa*, the simpler provisional arrangements first mentioned answer the purpose sufficiently well, and the outlay involved is significant."

RUDOLPH D. ANSTEAD, *Planting Expert.*

Notes and Comments by the Scientific Officer.

57. *Stump Rot in Tea*.—On some of the Nilgiri Tea estates there grows a small tree which invariably produces Stump Rot when it dies. Nurseries must be most carefully cleaned of all stumps of this tree.

Specimens have recently been collected, and sent to Coimbatore, where Dr. Barber, the Madras Government Botanist, identified the tree as *Symplocos spicata*, Roxb. The Genus *Symplocos* is represented by a large number of Indian species, one of which, *S. racemosa*, is mentioned in Watt's 'Commercial Products of India' as supplying a bark used in dyeing, and Hindu medicine.

S. spicata is described in Brandis' 'Indian Trees'. It is a middle-sized tree, with smooth, leathery leaves, about 7 inches long. The margins of these are slightly notched, and they terminate in a sharp point. The leaf stalks are about $\frac{1}{2}$ -inch long. The flowers are white, and appear, from December to January as a rule, in little branched bunches in the axils of the leaves. The fruit is a small round berry about $\frac{1}{4}$ -inch in diameter.

It is a fairly common tree in the Nilgiri and Shevaroy Hills, and is known locally as 'Pithacottai', while the Budagas call it 'Boothagani'. This description may help Tea planters, who do not know the tree, to recognise it, and take the necessary precautions against Stump Rot when it dies, or is killed. A Tea planter writing to me about it says; "It is the worst tree for Root Rot up here (near Coonoor) I know, and I dig it out wherever I find it. It is luckily not deep rooted, so comes out fairly easily."

Another planter, writing about this tree, says:—

"The roots of this tree I find most deadly in causing Stump Rot in young clearings, generally after the second year from planting. I have found digging out all the roots of *S. spicata* effective, and where any bushes are attacked, the digging of them up, and then a thorough turning over of the soil, and the application of Lime. This treatment was advocated by Dr. Butler when he visited these hills in 1903 or 1904. So far *S. spicata* is the only tree at this elevation, 5500 to 6300 feet, that I have found causing Stump Rot and attacked by it itself. It is an extremely soft wood, and every tree has some parasite or scale on it."

RUDOLPH D. ANSTEAD,

Planting Expert.

INTERNATIONAL RUBBER EXHIBITION, LONDON.

The Rubber Growers' Association, London, have decided to present the Committee of the International Rubber and Allied Trades Exhibition, with three Medals (gold, silver and bronze) to be awarded for the best exhibit of certain kinds of crude rubber; full particulars will be published shortly. The *India Rubber Journal* of London is presenting a Shield valued at one hundred guineas for the best exhibit of Plantation Para Rubber; conditions will be issued shortly.

—:o:—

From 1st July 1910, the Head-quarters of the Inspector-General of Agriculture in India will be at Pusa instead of at Nagpur, C. P. His postal and telegraphic address from that date is Pusa, Bengal. Pusa is six miles by road from Waini Station in B. & N. W. Ry. All parcels sent to him by Railway should be sent to that Station.

DISTRICT PLANTERS' ASSOCIATIONS.

Coorg Planters' Association.

The usual Quarterly General Meeting of the above Association was held at the North Coorg Club house on the 4th June, 1910.

PRESENT :—Messrs. Murray-Aynsley, G. K. Martin, H. C. Wood, W. M. Ball, Dickinson, Garrett, W. R. Wright, Sinclair Grove, P. G. Tipping, G. L. Newbery, Bracken, Graham, A. I. Curgenvin, Commissioner of Coorg, C. D. McCarthy, Conservator of Forests, Gustav Haller, Assistant Director of Agriculture, and R. D. Tipping, Honorary Secretary. The President, Mr. Murray-Aynsley, in the Chair.

New Member.—Mr. G. L. Newbery was elected.

It was resolved that the accounts be passed at the next Quarterly Meeting.

REPORT OF THE WORKING OF THE COORG PLANTERS' ASSOCIATION, SEASON 1909-10.

Gentlemen.—At this our final meeting of season 1909-10, I have the pleasure to lay the accounts before you, and will proceed to give you a short resumé of what has been done in the past year. As you all, I hope, get a copy of the *Planters' Chronicle* weekly, in which the circulars of the U. P. A. appear, it is needless for me to take these in detail.

The accounts which are now before you, will show 1.—That the subscriptions to the C. P. A. amounted to Rs.564 with an expenditure of Rs.576-4-0, which includes Rs.26-1-0 for printing copies of the two Labour Acts, and Rs.62-8-0 the cost of Books of the Proceedings of the last U. P. A. Meeting at Bangalore, an outlay which I trust met with your approval. The balance in hand at the end of the season, Rs.148-6-3, a very small one. I propose to consider this matter, when we decide at this meeting as to the amount of our contribution to the U.P.A. Funds this season.

The Scientific Officer's Fund.—Rs.475-2-3 was collected, and our subscription amounted to Rs.300, besides which we paid for 3½ months arrears of subscription, which fell due before we started this fund. We have now Rs.67-2-3 in hand, and have paid Rs.12-8-0 in advance to the Secy., U.P.A.

Planters' Benevolent Fund.—We have only received one subscription in the past season, which was from Messrs. Volkart Bros., of Rs.40, and they have promised Rs.200 in all.

Gentlemen, I would urge upon you the great importance of every Planter becoming a subscriber. The annual subscription for individual Members, is only Rs.10 per annum. I ask every one of you who can possibly do so to become a member of this Fund, which, if supported as it should be, will become a means of assisting Planters, or their families, who through no fault of their own are in distress. Proprietors and Managers are especially asked to make an effort to contribute substantially to the Fund. I may mention that I have received a few subscriptions in the present season. A subscription list will now be passed round. All members who have subscribed or intend to subscribe are asked to enter the amount of their donations.

Six new members joined our Association, during the past season, and with one exception, which I fear is irrecoverable, all our members have paid their subscriptions for the past season.

In this connection I would ask you to pass a rule to the effect "That a new member joining the Association, after six months of the year have elapsed shall qualify by paying a half year's subscription."

Roads and Communications.—We appear to be as far off as ever from obtaining some better means of transport than our bullock carts.

The Renard Road Train scheme of which we had such great hopes, appears to have fallen through; various drawbacks have been found to exist, and we shall have to wait till some more suitable means of traction is invented. Our appeal for an improvement to the roads, in Mysore leading to Coorg, met with a favourable reply. Regarding Davy's Crossing, I received a letter from Mr. G. K. Martin, which I will read and from which you will see that the question of the Pontoon ferry is receiving the necessary attention.

Stamped Papers for Maistries and Coolies Agreements.—The District Magistrate of Coorg has ruled that agreements up to a value of Rs.50 may be drawn up on a 1 anna stamped paper, a decision which is very satisfactory.

Rinderpest.—The question of the destruction of the carcasses of bullocks, which die of disease on the main roads, has been taken up, and I am informed that local Patels are the officials to whom we should look to carry out this duty. It was pointed out that these Patels live in some cases many miles from the main roads, and it would be difficult to report such occurrences to them. A suggestion was made that the Police might take the necessary steps; however, I have been informed by the Assistant Superintendent of Police that this cannot be done. It is recorded with satisfaction that the Assistant Superintendent of Police has undertaken to provide an adequate patrol on the Ghât Roads during the busy season.

Pepper Passes.—I have gone into the question of the issue of Passes for the transport of pepper, on the same lines as is done with Coffee. At present there is no check whatever on Pepper which is being carried from one place to another.

As far as I can learn nothing can be done here without an Act; and as Pepper is steadily increasing in importance, especially in S. Coorg, it behoves us to see if something cannot be done in the matter. I have consulted the District Magistrate and the Assistant Superintendent of Police on the subject.

Accounts.—The question of finances, and especially the contribution towards the U. P. A. Funds on an acreage basis, was fully discussed, and it was unanimously resolved that in future the subscription to the Coorg Planters' Association shall be at the rate of 1 anna 6 pies per acre on the cultivated area under Coffee, to which resolution was added, that Superintendents, or Managers of Estates paying not less than 12 per annum, shall be eligible as members of this Association. As the above cannot come into force during the present financial year, the question of membership shall be held over for discussion at the next General Meeting. It was pointed out that 6 pies per acre would be required for our Scientific Officer's Fund, 8 pies per acre for the U. P. A. subscription, and 4 pies per acre for our own Association, or 1 anna 6 pies in all.

The ballot for this season resulted in Mr. Murray-Aynsley being elected President, Mr. R. D. Tipping, Honorary Secretary, and the following as Members of Committee:—Ball, Bracken, E. M. Breithaupt, Grant, Graham, A. H. Jackson, Macrae, Maclean, H. M. Mann, P. G. Tipping, Irwin, and G. R. Pearse.

It was resolved that the Agenda Paper of the U. P. A. be considered at a Committee Meeting in South Coorg.

Messrs. Murray-Aynsley and R. D. Tipping were appointed Delegates to the U. P. A. meeting to be held on the 1st August and succeeding days.

A subscription list for the Planters' Benevolent Fund was passed round, and resulted in some Rs.400 being promised by members present.

(Sd.) R. D. TIPPING, *Honorary Secretary.*

INDIAN TEA ASSOCIATION, CALCUTTA.

Extracts from Abstract of the Proceedings of a Meeting of the General Committee held on June 28, 1910.

The Scientific Department.—In the proceedings of the Assam Branch for the month of May there was printed a letter, dated 14th May 1910, from the Acting Chairman of the Branch to the Chairman of the Tea Cess Committee, asking, as some adverse criticisms had reached him with regard to the Scientific Department of the Association, that the following questions might be considered at the next meeting, *viz* :—

(a) Whether it is necessary to have a Local Advisory Committee in connection with this Department.

(b) If so, would it not be politic to give this Advisory Committee some official status in conjunction with the governing body so that they might have some voice in the affairs of the Department.

The opinion was expressed that a Local Advisory Committee would materially strengthen the hands of the Scientific Officers.

The Chairman remarked that the Cess Committee would probably be holding their next meeting at the end of July, when a meeting between the General Committee and the representatives of the Branches who would then be in Calcutta could be arranged to discuss questions connected with the Department. At the present time there were a number of questions requiring consideration, an important one being that of the provision of a new Experimental Station with the necessary buildings, which Dr. Hope regarded as absolutely necessary. . . . Dr. Hope would be returning to Calcutta shortly, and it would be necessary for him to draw up a memorandum of the work already done and of that remaining to be accomplished.

The General Committee approved of the suggestions.

RECRUITMENT OF LABOUR IN MADRAS AGENCY TRACTS.

MEMO:—The subjoined copy of a letter No. 485-O., dated 14th June 1910 which the General Committee have addressed to the Government of Madras on this subject has been circulated.

No. 485-O., dated Calcutta, 14th June, 1910.

From—The ACTING SECRETARY, Indian Tea Association.

To—The SECRETARY to the Government of Madras, Public Department.

I have the honour to address you with regard to a matter which has for some time past engaged the attention of the General Committee of this Association. It refers to the possibility of having the Ganjam, Godavari and Vizagapatam Agency tracts opened to *sirdari* recruiting. Recruiting from the Ganjam and Vizagapatam tracts for the tea gardens of Assam was absolutely prohibited by the Government of Madras Orders G. O. No. 1020 Public, dated the 8th October 1901 and G. O. No. 302 Public, dated the 1st April 1902.

2. The Assam Labour Enquiry Committee of 1906 reported strongly in favour of having the Agency tracts opened to recruiting.

Paras 120 to 122 of the Report of the Assam Labour Enquiry Committee 1906.

"The Committee consider it is a pity that emigration should be absolutely prohibited from these tracts. There are numbers of people from the Ganjam Agency Tracts in Assam, where they have done well for themselves. At present it is impossible for a Khond or a Sawara to go down to the Ganjam Agency and bring up any friends or relations whom he might wish to have with him in Assam." Reference is made to the poverty of the people under their

present conditions of life and to the benefit that they would obtain were it possible for them to emigrate to the tea districts. The climate in the tracts is unhealthy and, in the words of the Committee, "the people are admittedly backward and poverty-stricken and it is exactly persons living a precarious existence in parts far removed from civilization who benefit most "by emigrating to Assam." In para. 122 of the Report it is recorded that the views of the local Officers were also to the effect that a certain amount of emigration might be beneficial. The Collector of Ganjam stated in his evidence that he would not object to sardari recruiting as the Northern and Southern extremities of the Agency tracts as the jungle had nearly gone in these parts and in times of scarcity it would be a good thing to have an outlet for the Khonds. Mr. J. S. Heaney, I.C.S., Assistant Collector, Ganjam, had no doubt that the condition of the Khonds would be much better in Assam than in their own country; and his objections to emigration were largely due to the unsatisfactory conditions of recruitment. Mr. J. M. Turing, I.C.S., Head Assistant Collector, Vizianagram, expressed the opinion that there are certain portions of the agency tracts where recruiting for Assam might safely be carried on, and that certain castes would not be missed if Assam took them. The Government of India, in para. 15 of the Resolution on the Report of the Labour Committee, dated 13th February 1908, dealt with the recommendation of the Committee in this connection. They noted that the Government of Madras were opposed to the Agency tracts being opened to recruitment; and with this view the Government of India agreed.

3. Since the date of the Resolution above referred to, however, Mr. J. F. Gruning, I. C. S., the Officer deputed in 1908-1909 by the Government of Eastern Bengal and Assam on special duty in connection with emigration, has made a prolonged tour. He has expressed the belief that the agency tracts would form an excellent recruiting ground and that the inhabitants would make good labourers. It is strongly felt by the industry that an opportunity should be given of carrying out the recommendations of the Enquiry Committee, and they think that the present would be a suitable time for doing so. For in Ganjam afforestation has, it is understood, been commenced and this being so a number of cultivators who cultivate on the "jhuming" system will presumably be displaced as in a year or two newly planted forests will be coming up.

4. In para. 122 of their report the Enquiry Committee put forward the suggestion that the prohibition against recruitment should be withdrawn on certain conditions which might be acceptable both to Government and to planters. It was further suggested that gardens having Khonds or other natives of the tracts might send the latter down as sardars accredited to a local agent approved of by Government. The gardens would pay for the services of a special officer, of the standing of a Tahsildar, to be appointed for the supervision of recruitment for perhaps five months in the year. If the scheme were found to work well for a season or two it would probably be unnecessary to continue the arrangement of employing a special Officer once emigration had been started on these lines. The Enquiry Committee recorded their belief that if the emigrant were taken to Assam by people of their own class they would soon take to the life on the gardens and there would be no trouble about their staying there. The General Committee are confident that if such a scheme as this were given a trial it would be found to work satisfactorily and that there would be no reason on the part of Government to regret having taken action on the lines indicated. They accordingly venture to express the hope that their representation will receive favourable consideration and that steps will be taken at a conveniently early date to have effect given to their request.

CORRESPONDENCE.**Crude Oil Emulsion.**

Pusa, the 7th July, 1910.

Dear Sir,—In reference to the article on ticks in the *Planters' Chronicle*, p. 282, Mr. Anstead gives statement about Mr. Cousins' "Paranaph" treatment for cattle, costing Rs.1-8-0 per head of cattle annually. May I draw your attention to p. 287 of the *Agricultural Journal of India*, Vol. I, where Mr. Stewart describes his experiences with treating cattle with Crude Oil Emulsion at a cost of 2 annas 2 pies per head per annum? Mr. Cousins' Paranaph contains:—

56 lbs. Soft Soap,
6 lbs. Naphthalene,
13 lbs. (2 gallons) oil.

That is, of 75 lbs. weight, 50 lbs. is soap, the costly and non-effective ingredient, while only 20 out of 75 lbs. is oil and naphthalene (26·6%). In Crude Oil Emulsion 80% is Crude Oil, and this enables us to produce it at such small cost. I draw your attention to this, as Crude Oil Emulsion is obtainable in India and as 80% emulsion was evolved 8 years ago as an improvement on Cousins' costly Paranaph which has now gone out of use.

Yours faithfully,

H. M. LEFROY,

*Imperial Entomologist.***CONDITIONS IN WILD RUBBER INDUSTRY OF BAHIA.**

The following information relative to conditions in the State of Bahia is from the report by H. M. Consul at Bahia (Mr. W. H. M. Sinclair) on the trade of that district in 1909:—

The State of Bahia is about half as large again as the British Isles, while the population is under 3,000,000. Owing to this scanty population the State Government is not rich and is not able to maintain a police force capable of enforcing its authority in the more remote districts. Many rubber estates include tracts of forest land apart from actual plantations. The boundaries of these estates are ill defined and the cost of fencing almost prohibitive. This results in natives trespassing on the properties and tapping the wild rubber trees, much to the detriment of the trees, as the process is not carefully conducted under the circumstances, and many trees are destroyed. Legal proceedings are protracted and costly, so that owners prefer the loss of half the possible yield from the estates to embarking in litigation. Plantations are not subject to loss of the above description. Forest rubber lands will not produce anything approaching the amount of rubber the number of trees would lead one to expect.

—:O:—

H. M. Commercial Attaché at Yokohama (Mr. E. F. Crowe) reports that it is proposed to make a special attempt to extend the market abroad for Japanese tea. A district in the United States of Canada will be selected, a chief office established at a centre in it, and propaganda carried on to create a demand for Japanese tea. Operations will gradually be extended. This plan is to be carried out over a period of ten years, beginning from next year. The annual cost is estimated at 160,000 yen (about £16,300), and it is hoped to obtain a Government subsidy of 100,000 yen (about £10,200).

SELECTED CUTTINGS.

The Fungi in Relation to Agriculture.

Much misapprehension has existed for many years, in the world of Agriculture, with regard to the true significance of the term Fungus. In the early days, when the results of abstract biological science were first employed in connection with practical agriculture from an economic standpoint, there was often uncertainty, on the part of those in receipt of advice, as to the place of fungi among living beings. Thus the term came to have a somewhat loose significance, as is naturally the case when a word is employed commonly in one more or less specialized relation. It is easy to understand, for example, the difficulty of realizing that the fungus causing root disease of sugar-cane, is actually a relative of the grey fungus so commonly found on the parts of dead trees.

The fungi form a sub-division of the plant kingdom. The group consists of several thousand species of plants, which differ enormously in size, structure and complexity. They are grouped together for several reasons, as for example, the similarity of their vegetative parts, the fact that they are all reproduced by means of spores, and that all of them, without exception, have entirely lost the power of forming chlorophyll—the green colouring matter which occurs in all other plants, with but few exceptions, and without which the plant is unable to elaborate its own food-supply from the carbon dioxide and oxygen contained in the air. For this reason, the fungi may be looked upon as a degenerate group of plants, that is, when regarded from the standpoint of the main path of evolution, in their own line, however, they have attained very considerable complexity in their reproductive arrangements, and also show many and varied forms of adaptation to the manner of life which they have been driven by different circumstances to adopt. Members of this large assemblage of plants may be found living under the most various circumstances of temperature and moisture, and with widely different sources of food supply.

It will now be apparent that a term which is applicable to so many and so various forms of plant life can hardly be expected to possess in reality the narrow significance indicated in the opening paragraph.

The subject may be further considered at somewhat greater length from a different point of view. Since the fungi are unable to obtain their own food-supply from the air, it follows that they must obtain it already manufactured from one or more sources. The only organism that can manufacture its own food-supply from the air is the green plant, so that, clearly, one possible source of food for the fungi is the bodies of such plants, either alive or dead; moreover, since animals may be regarded as fundamentally dependent on green plants for their food-supply, their dead or living bodies also offer a possible source of food to the fungi. These are the only available food-supplies for these plants.

As would be naturally expected, all four sources of food, namely living and dead plants, and living and dead animals, are utilised by different species of fungi. Those fungi which live on dead plants or animals, or on the products of the decay of such, are known as saprophytes; while those that obtain their food from living sources are known as parasites. There is an intermediate class, the facultative parasites, which can attack some living plants, or can if necessary, live on dead vegetable matter.

Although these are the more technical divisions of the fungi, they may be considered differently in their relation to agriculture. In this connexion, there are three points of importance. Firstly, there is the damage that they

cause; secondly, the advantages that some of them confer; and lastly, the development of which these advantages are capable.

Some of the forms that grow on animal and vegetable products—saprophytes—are a source of annoyance and loss to man, as for example the moulds that grow on grain, bread, cheese, and other eatables, or even on cloth and leather. These may, however, be kept in check without much difficulty. Among the facultative parasites, many species can attack the roots of various economic plants, and even if they do not actually bring about the death of their hosts, they weaken them to such an extent that the value of the crop produced is greatly diminished; moreover, their power of living on decaying remains of these hosts, or even on those of other plants, renders them extremely difficult to eradicate, once they have obtained a hold. Among the class known as parasites are included all those forms understood by the term Fungus in its more narrow application. They are undoubtedly a source of great loss to all those interested in agriculture, and even when the greater part of the loss can be obviated by the employment of sound preventive measures, the carrying out of such measures involves the expenditure of considerable sums of money.

On the other hand, many species are of considerable service to man, for several of them help to destroy old plant and animal remains, and in this way act as scavengers. They may, for example, live on heaps of dead leaves, old tree stumps, decaying branches, or any other accumulations of rubbish. They often possess the power of secreting enzymes, which can dissolve various forms of organic matter not otherwise easily destructible. The products of their action go to increase the humus content of the soil, often in forms in which they are available to higher plants as a source of food. Such fungi must be regarded as useful, both in their capacity of scavengers, and in their function of suppliers of humus products to various crops. Other species can live on harmful fungi, and are useful in this way, while still others are parasitic on various insects of economic importance and are, even under natural conditions, of great importance as a supplementary means of keeping such insects under control.

The recognition of this last point is of comparatively recent date, and the observations and experiments that have been carried out so far tend to show that it is of primary importance in the control of certain insect pests in tropical and sub-tropical climates. The parasitic fungi may be readily encouraged by various means, and under such circumstances afford a way of controlling such pests, which is very much cheaper, and at the same time more effective, in many cases, than any of the artificial methods in common use at the present time. The employment of parasitic fungi in the control of various pests is at present, comparatively speaking, in its infancy, but there can be little doubt that, should this method fulfil in the future the promise held out by the results of experiments conducted up to the present time, it will prove of the utmost service to the practical agriculturist.—*Agricultural News*.

GUANO FOR RUBBER TREES.

A planter from the Dutch Islands, in a communication to the "Agricultural Bulletin of the Straits Settlements," stated that he had a remarkable increase in the growth of his Pará rubber trees after using imported guano. A small quantity was put round each tree in a shallow trench surrounding the tree, and covered in with soil. The cost was three cents (1½d.) per tree. This inexpensive method of manuring might be very useful in bringing on young plants.

The Planters' Chronicle.

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JULY 23, 1910.

[PRICE AS. 4.

THE U. P. A. S. I.

(INCORPORATED.)

The Annual Meeting, 1910.

There appears to be a prospect of a good attendance of delegates at the Annual Meeting; and invitations have been issued to several officials to attend and to various mercantile firms to send representatives should they be desirous of doing so.

The usual Committee Meeting will commence, at the Mayo Hall, Bangalore, at 11 a.m. on Monday, August 1st; and the Annual Meeting at 3 p.m. the same day. It is expected that the comprehensive subject of "Agricultural Products" will be taken up at 11 a.m. on Wednesday, August 3.

Mr. J. A. Richardson, the Chairman, is already in Bangalore, attending the U. P. A. S. I. office daily and discussing matters with the Scientific Officer and the Secretary. The keen interest he is thus displaying in the work of the Association and the preparations for the Annual Meeting will no doubt be appreciated by planters, who are certain also to congratulate him very heartily on his recent appointment as a non-official member of the Travancore Legislative Council.

Herbarium Specimens.

In accordance with the promise made in the *Planters' Chronicle*, Vol. V, pp 286, eight sheets of herbarium specimens of Leguminous Plants have been forwarded to the Coorg Planters' Association. These with the references to their mention in the *Planters' Chronicle* are as follows:—

- | | |
|----------------------------------|--|
| 1. <i>Cassia mimosoides</i> . | ... (Vol. IV, pp. 356, Vol. V, pp. 163, 168, 186, 199, 243, 271.) |
| 2. <i>Tephrosia purpurea</i> . | ... (Vol. V, pp. 29, 152, 163, 186, 199, 213, 221, 257, 267, 286.) |
| 3. <i>Tephrosia tinctoria</i> . | ... (Vol. V, pp. 152, 163, 186, 199.) |
| 4. <i>Desmodium triflorum</i> . | ... (Vol. V, pp. 152, 297.) |
| 5. <i>Crotalaria nana</i> . | ... (Vol. V, pp. 152, 163.) |
| 6. <i>Pseudarthria viscida</i> . | |
| 7. <i>Desmodium triquetrum</i> . | |
| 8. <i>Smithia geminiflora</i> . | |

The Abol Syringe.

In reference to pp. 297, the Imperial Entomologist, Pusa, kindly writes that the Abol syringe referred to, "which is an excellent syringe for cattle, &c.," is, at his request, stocked and sold by Messrs. Macdougall & Co., Oriental Buildings, Bombay.

Sprayers.

A report by the Scientific Officer on three different makes of Sprayers kindly sent by Messrs. Oakes & Co., Ltd., of Madras, for practical trial will be published in next week's issue of this paper.

S. I. P. B. F.**SUBSCRIPTIONS TO JULY 21, 1910.**

The first list of subscriptions and donations to the above Fund is given below, with the names of individual subscribers where these have been furnished. Other sums have been promised by various District Associations, but the present list relates only to cash actually received. It is hoped that there will soon be occasion to publish a second list; and that the Fund will grow steadily, if not rapidly.

Per NORTH MYSORE P. A.

	Rs.		Rs.
The Association	... 250	C. Courpalais	... 10
C. Courpalais	... 200	S. H. Dennis	... 10
A. J. Saldanha & Sons	... 200	H. Pilkington	... 10
T. H. Allan & Co.	... 100	N. G. B. Kirwan	... 10
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C. H. Browne	... 10	H. M. Northey	... 10
R. G. Foster	... 10	A. Durham	... 10
E. C. Bolton	... 10	R. W. Fremlin	... 10
C. Danvers	... 10	S. L. Mathias	... 10
C. P. Reed	... 10	J. H. Robinson	... 10
A. F. Evetts	... 10	L. P. Kent	... 10
C. S. Crawford	... 10	E. H. Young	... 5
F. W. Hight	... 10		— Rs.965

Per SOUTH TRAVANCORE P. A.

Donation—Messrs. Cameron & Co.		Subscription—R. Ross	
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.. S. W. Sinclair	... 30	.. J. C. Parker	... 10
Subscription—D. G. Cameron	... 25	.. C. Brander	... 10
.. J. A. Cook	... 10	.. S. W. Sinclair	... 10
.. J. S. Valentine	... 10	.. E. Lord	... 10
			— .. 545

Per COORG P. A. 500

Per SOUTH MYSORE P. A. 439

Per CENTRAL TRAVANCORE P. A.

Hon. V. B. Wilbraham	... 50	E. S. Stephens	... 10
J. A. Richardson	... 40	T. C. Forbes	... 10
F. Bissett	... 20	J. F. Fraser	... 10
H. C. Westaway	... 20	F. E. Thomas	... 10
B. Wolde	... 20	T. A. Kinmond	... 10
W. H. G. Leahy	... 20	J. D. Deane	... 10
R. P. Rossier	... 20	C. G. Gordon	... 10
T. A. Vernon	... 10	J. A. Wilkie	... 5
			— .. 275

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The Association	... 20	W. Rahm	... 10
W. I. Lechler	... 10	S. Cambell	... 10
C. G. Lechler	... 10	R. A. Gilby	... 10
B. Cayley	... 10	E. Dickins	... 10
W. Hight	... 10	A. B. Kundaswamy	... 10
E. Large	... 10	C. Dickins	... 10
B. Short	... 10	R. Gompertz	... 10
J. C. Cobbe	... 10	G. Turner	... 10
C. Rahm	... 10	S. M. Hight	... 10
J. C. Large	... 10	T. Manuel	... 10
			— .. 210

Per KANAN DEVAN P. A.

The Association	... 30	W. J. Dixon	... 10
" A Friend "	... 100	C. Fraser	... 10
J. C. Abbott	... 10	W. O. Milne	... 10
J. R. Bridgman	... 10	A. Yates	... 10
			— .. 190

Donation from Peirce, Leslie & Co., Ltd.

" " Darragh, Smail & Co.	... ..	Rs. 250
" " Aspinwall & Co.	... ..	150
" " Geo. Romilly	... ..	50
Subscription of Aylmer ff. Martin	... ..	50
" J. A. Graham	... ..	10
		— Rs. 3,644

Scientific Officer's Papers.**XXXVI.—HUMUS.**

A. D. Hall, in his book on 'The Soil,' thus defines Humus:—"The term humus is applied to the black or dark brown material of vegetable origin which gives to surface soil its characteristic darker colour as compared with the sub-soil. It is essentially a product of bacterial action."

It is derived from the remains of previous generations of plants left on, or in, the soil, and is acted upon, and caused to decay by, fungi of various kinds, and by a class of bacteria which work in the absence of air, and which obtain the oxygen necessary for their existence by breaking up the tissues of vegetable and animal matter in the soil, such as leaves, dead branches, dung, and fish manure. This decay gives rise to acid bodies which unite readily with Ammonia and Potash and form insoluble compounds which slowly become soluble again, and so available for the plant. Humus in the soil in this way prevents the plant food being all rapidly washed out by the rain.

In order that a soil may be fertile the presence of a certain amount of humus in it is essential. It plays a most important part in the physical condition of the soil, and herein lies its value more than as an actual plant food. It is the great reservoir which retains the soil moisture and nitrogen. Owing to the activity of the bacteria in it, it constantly gives off Carbonic Acid gas which is dissolved by the soil water, and the acid solution thus formed acts upon the rocks and stones, setting free the Potash and Phosphates in them, and thus providing a constant supply of these important plant foods, which before were in an insoluble form and so unavailable for crops.

Humus contains a great proportion of the nitrogen in soils, this nitrogen being derived from the Albumenoids in the organic matter from which it was formed. This nitrogen is in an insoluble form, and so it is not washed out and carried away in the drains. As the Humus decays, the nitrogen is made soluble again, and thus a constant supply is maintained for the needs of the crop.

Humus, again, determines to a large extent the power of a soil to absorb and retain moisture, which is a very important factor in a fertile soil. Pure humus will hold more water than sand or clay; 100 lbs. of sand will hold only 25 to 29 lbs. of water; if more is added it runs out and is carried away in the drainage water. In the same way 100 lbs. of clay will hold 40 to 50 lbs. of water; 100 lbs. of a soil rich in humus, on the other hand, will hold 85 to 90 lbs. of water, while 100 lbs. of pure humus itself will hold 190 lbs. of water. Again 88% of the moisture in a sandy soil will evaporate away in 4 hours in hot weather, while in a soil rich in humus, only 21 to 25%, will evaporate in the same time and under the same conditions. So the more humus a soil contains the more moisture it can absorb and retain. Humus absorbs water and holds it like a sponge, and causes it to rise near the surface where it will most benefit the plant.

Thus it will be seen that humus is a very important constituent of a fertile soil. It is always tending to diminish in quantity owing to decay and oxidation, and it must, from time to time, be added to. Vegetable manures like Cattle manure, Poonac, and Fish, supply Humus, as do mulches of leaves. Green dressings of various sorts are most valuable additions to the Humus content of the soil.

A soil which is deficient in humus is always in a poor mechanical condition, and it is of little use to then add merely mineral fertilisers, which supply no vegetable matter, and such fertilisers should be used in con-

junction with green dressings, or in rotation with Humus-supplying manures, in order to give the best results.

It has been mentioned that the decay of Humus produces acid bodies. These are normally neutralised by the lime in the soil. If the lime is not present in sufficient quantity, an acid state results which prohibits the action of many valuable kinds of bacteria which fix Nitrogen, and convert Ammonia into nitrates, in which form alone Nitrogen is available to the crops. Consequently it is not only important that a fertile soil should contain plenty of Humus, but also that it should contain enough lime to render the decomposition products of the Humus available to the plant. A soil which contains less than one per cent. of lime as Calcium Carbonate will be benefited by liming, and when it contains less than half a per cent., lime is an absolute necessity. Hence lime must take its place in a manuring system, as well as Humus, on a soil naturally deficient in this constituent. The question as to whether lime is needed as a regular part of the manuring scheme on any soil is readily decided by a chemical analysis of the soil, and this is one of the advantages of having a soil analysed as a preliminary to deciding upon the manurial system which is likely to be best suited to it.

RUDOLPH D. ANSTEAD,
Planting Expert.

AGRICULTURE AND THE SUPPLY OF LABOUR.

The following extract from an article in *The Agricultural News* will interest many planters in South India, although it was written with special reference to conditions in the West Indies :—

“ In considering what steps should be taken in order that a constant supply of adequate labour may be ensured, where there are signs that this might become no longer available, assistance will be gained from a proper realization of the obvious fact that the labourer works solely in order that he may provide himself, and those who are dependent on him, with the means to live, together with as many luxuries as he can command. As time passes, the evidence of any sentiment of attachment to a particular employer or place is quickly becoming smaller. These conditions make it natural that the supply of labour should move in those directions where it appears that the greatest prices will be paid for it. This is no longer a local condition, for as has been considered already, it leads to emigration, and that the more easily, as means of transport are increased and made cheaper. The fact of practical value immediately suggested by this is that, if this unsteadiness of labour-supply is to be remedied, it must be made worth the labourer's while to remain where he is being employed; an appeal must be made to him through the provision of additions to his welfare; he must be convinced by a material argument which he is able to appreciate.

“ The way in which this argument may be provided is a matter for trial, and the application of the suggestions arising after experience. It will vary in different places, and will require modification as conditions change with time. Efforts toward its discovery are being made already; one of these, namely the scheme of giving bonuses for permanent labourers, adopted at the Antigua Sugar Factory, was described shortly in the last number of the *Agricultural News*, and it is of interest that this has proved itself worthy of extension. Such endeavours should result in adding the value of permanency to that of the presence of labour and, as regards the labourer, should enhance the sense of the value of his continuous work and of his self-respect.

Notes and Comments by the Scientific Officer.

58. *Atylosia Candollei*.—A plant which is found to form a good green dressing, and supply a large quantity of material for mulching, or digging in to Tea, in the Nilgiris, bears this Botanical name.

It is known in the neighbourhood of Coonoor as *Thovarai*, and the Budagas call it *Kardaverai*.

It is a shrubby plant reaching a height of 4 to 5 feet, branching copiously low down, the younger shoots being covered with a brown felt. The leaves are trifoliate, that is, are arranged like the fingers of a hand but are in threes. They are thick and rough, $3\frac{1}{2}$ to 4 inches long, and $1\frac{1}{2}$ inches wide. The under surface is a light sage-green colour, and covered with a net-work of veins. The flowers are large, pea-shaped, yellow and brown, and the flower stalks spring from the axils of the leaves.

On Nilgiri Tea estates it is allowed to grow up among the Tea, and is cut down and dug in from time to time. I understand that seed is difficult to obtain in quantity, as it does not set well and it is eaten by the coolies. One planter, who has used the plant very successfully, writes, "I like the *Atylosia*, but it is difficult to get seed, and it does not, so far, come up well if sown, so I leave mine to sow themselves."

59. *Basic Superphosphate for Coffee*.—In answer to an enquiry which has been received as to the best way, and time, to apply Basic Superphosphate as a fertiliser for Coffee, the following recommendation was made, which is in the nature of an experiment. The best time to apply soluble fertilisers to Coffee appears to be at the beginning of the year.

Method 1.—Apply in September or October, 4 cwt. per acre of Basic Superphosphate, guaranteed to contain at least 12 per cent. phosphoric Acid soluble in Citric Acid, and about 35 per cent. of lime. This should cost about Rs.45/8 per ton on the rails at Ranipet. (See *P. C.* Vol. V., pp., 129 and 189). Apply to the same field in February, or March, 1 cwt. per acre of Sulphate of Potash guaranteed to contain at least 45 per cent of Potash.

Method 2.—Apply in February or March a mixture of 4 cwt. Basic Superphosphate with 1 cwt. Sulphate of Potash, at the rate of 5 cwt. per. acre.

Nitrogen is not included in this scheme. If this constituent is to be added it must be remembered that Nitrate of Soda, and Nitrate of Potash, must not be mixed with Basic Superphosphate, or both will be spoiled.

In method 1 the Nitrogen might be supplied by 2 cwt. per acre of Nitrate of Soda applied at the same time as the Sulphate of Potash. In method 2 the Nitrogen would be best supplied as Poonac, Fish, or some similar manure, put out in September or October.

Should the quantities suggested above cost more than is thought should be spent on manures at the present Coffee prices, and this is a point which the individual planter must decide, they should be reduced to reasonable proportions, keeping them in the same ratio, for example, 3 cwt. of Basic Superphosphate to $\frac{1}{4}$ -cwt. of Sulphate of Potash.

RUDOLPH D. ANSTEAD, *Planting Expert*.

Costa Rica has turned attention to Rubber. There are a few plantations in the San Carlos plains, which promise excellently. The soil and climate of this extensive district are ideal for rubber, and the lands there are the richest in Costa Rica; they are accessible from the capital over a good cart load and from the Atlantic coast by launches of light draught up the San Juan and San Carlos Rivers.

DISTRICT PLANTERS' ASSOCIATIONS.**Wynaad Planters' Association.**

Proceedings of a Meeting held at Meppadi Club, July 13th, 1910.

PRESENT :—Messrs. Behr, Ewart, Macleod, Mead, Powell, Winterbotham and C. E. Abbott, Honorary Secretary. Mr. Mead in the Chair.

1594. *Proceedings of last Meeting* were confirmed.

1595. *Non-service of Warrants.*—Read Honorary Secretary's letter to D. S. P., North Malabar, and Mr. Squire's reply. Latter is to be referred to Mr. West for remarks.

Read letter from Mr. Malcolm complaining of the case of his Chin-naswamy Maistry, against whom 4 warrants have been issued, including a proclamation warrant, and who it is proved has been frequently in his village during the time these warrants were in force. He has now absconded to Cochin Territory.

Read Honorary Secretary's reply. The suggestion in this regarding asking for extra Police in the Coimbatore District is to be brought forward at the U.P.A.S.I. Meeting after consultation with the Nilgiri Delegates.

1596. *King Edward VII Memorial Fund.*—Read letter from Rao Bahadur C. Gopalan Nayar, Deputy Collector, to whom subscriptions to this Fund should be forwarded.

1597. *Poodapardy Post Office.*—The Honorary Secretary reported the result of his interview with Mr. Ricketts, Superintendent of Post Offices. Read letter from Mr. Ricketts. The Honorary Secretary to thank Mr. Ricketts for promising to provide a special bag to be tropped at Poodapardy, which will meet our requirements for the present.

1598. *Experiments with Pepper.*—Read letter from Honorary Secretary inquiring if Scientific Officer approved of experiments being made with a smaller number of vines (50 in each section instead of 200) and reply remarking that if this is done very great care must be taken in noting results. Mr. Behr was requested to send information as to experiments which had been made on estates in his charge.

1599. *Scientific Officer Fund.*—The Honorary Secretary stated he had paid half the subscription due for 1910-11 (Rs.315). Members who have not already sent their subscriptions are requested to do so.

1600. *Standard Weights.*—Read letter from Deputy Collector, Wynaad, forwarding Proceedings of Collector of Malabar, asking if the maund of 960 tolas (24 lbs.) would be adopted if introduced with its sub-multiples. Government has refused to introduce the standard 1 lb. weight.

Read letter from Honorary Secretary in reply stating that he did not think planters would find the weights referred to useful. Approved.

1601. *U. P. A. S. I. General Meeting.*—Read list of subjects for discussion; instructions were given to delegates on some of them.

1602. *Exhibition of Products.*—Read letter from Mr. Richardson, Chairman of the U. P. A. S. I., suggesting that Members should send samples of tea, coffee and rubber to be shown at Meeting.

As regards tea, he proposes that samples should be limited to 4 from each District, each to contain 2 oz. of each grade manufactured, these to be guaranteed to be invoice samples.

1603. *Extradition from Native States under Act XIII.*—Read circular No. 28 U. P. A. S. I. quoting a letter from Chief Secretary, Govern-

ment of Madras, asking if any difficulties have arisen in connection with the operation of Act XIII of 1859 owing to offenders absconding to Native States, and if in the opinion of the U. P. A. S. I. any special measures are desirable to provide for their arrest in such cases. Also asking for specific instances.

Read Honorary Secretary's reply saying that if any relief is granted in this respect to those working under Act XIII, similar relief ought to be given to those who have to work with Act I of 1903, as we are just as badly off.

One instance is that referred to above (para. 1595). When the fourth warrant against Chinnasawmy was issued last May and sent down with Mr. Malcolm's writer, Chinnasawmy, finding that business was really meant, cleared off to Cochin territory, where he is safe from arrest.

Members present promised to send in other cases.

1604. *Roads*.—Honorary Secretary was instructed to write to the District Board Engineer and ask that the work of spreading the metal collected last season on Road 38 and the Velleramulla road be expedited.

1605. *Theft of Tea Plants*.—Mr. Mead informed the Meeting that one of the Fast India Tea and Produce Company's nurseries at Cherambady had been robbed of a large number of plants.

Planters are asked to be careful about the source from which they purchase plants.

1606. *Papers on Table*.—

- (1) Government Order on Collectors of Malabar and Nilgiris reports on the working of Act I.
- (2) I. T. A. circulars.
- (3) Circulars from Messrs. Best & Co., regarding supply of liquid fuel.
- (4) The Honorary Secretary has received 3 samples of Vermisapon, which Messrs. Mead, Behr and Winterbotham promised to experiment with.

A vote of thanks to the Chair terminated the Proceedings.

(Signed) A. H. MEAD, *Chairman*.

(„) C. E. ABBOTT, *Hon. Secy.*

[It was agreed to hold the next Meeting on September 14, 1910].

—:o:—

Mundakayam Rubber Planters' Association.

Minutes of a General Meeting of the Mundakayam Rubber Planters' Association held at the Kuttikal Bungalow on the 2nd July, 1910, at 11 a.m.

PRESENT :—Messrs. G. Atkins, G. Danvers Davy, R. Harley (by proxy), R. E. Haslam, F. H. Hall, F. A. W. Meumman, J. J. Murphy (chairman), A. E. Vernede, J. R. Vincent (Hon. Secy.) and A. C. Vincent.

The Chairman proposed that this Association records its grief at the death of King-Emperor. The resolution was passed in silence, all present standing.

Read Minutes of previous meeting and two Committee Meetings.

Doctor Scheme.—Mr. Murphy proposed and Mr. Davy seconded the following amendment to the scheme:—“That a Cess be levied from all Estates in the Peermade and Mundakayam Districts to pay for the expenses of the Doctor and establishment.”

This amendment was carried, and accepted by the following Estates; Yendayar, El Dorado, Kokayar, Kadamancolam, Kuppakayam, Paloor, Chen-

napara, Cheruvally, Mundakayam ~~Syndicate~~, Kutikal, Anakolam and Peruvanthanum.

Legislative Council.—Mr. Richardson's action was confirmed, and he was congratulated on his appointment as non-official member.

U. P. A. S. I. Agenda.—Instructions to delegate.

Scientific Officer Scheme.—The amount to be subscribed towards the laboratory to be left to the Delegate.

Prevention of Rubber Thefts.—It was resolved that the U. P. A. S. I. be asked to request the Planting Member to try and get the British Government to include Rubber in the Coffee Thefts Act.

1911 Rubber Exhibition.—The delegate was asked to use his discretion, but it was pointed out that the funds of the Association would not admit of any financial support.

Weights and Measures.—The Association is in favour of standardisation.

Labour.—The delegate was instructed to vote for any measure calculated to prevent the enticement of advanced labour, or the prevention of, emigration.

Non-Service of Warrants.—The Association declared itself in favour of any proposal for the bettering of the service of warrants.

Rani Road.—Read letters from the Resident and the Chief Secretary to Government, and in view of the unfavourable answers received, it was resolved to ask the non-official member of the Legislative Council, Mr. Richardson, to put the matter before the Government.

Poonjar Road.—The Honorary Secretary was requested to write about this on the 1st of next Malabar year, quoting the Acting Chief Engineer's letter.

Teekey Roads.—The Honorary Secretary was requested to write to the Dewan with reference to the Bridges between Palai and Errattupetta, and the general unsatisfactory condition of the roads about Errattupetta, and Kanjirapally.

Kuttikal Road.—The Honorary Secretary was instructed to write and tender for the upkeep and maintenance of this road this year and next.

Right of Way from Mundakayam Estate.—The Honorary Secretary was requested to consult with Mr. Atkins and send a reminder to Government requesting an answer to the Association's previous letter.

Government Gazette and Almanac.—It was resolved to purchase these for the Association this year.

Removal of Civil Court from Kanjirapally.—The Honorary Secretary was instructed to write and ask for an answer to the Association's letter on the subject.

Typewriter.—Owing to the low state of the funds of the Association it was decided not to purchase a machine.

Delegate to U.P.A.S.I.—It was proposed by Mr. Vincent and seconded by Mr. Haslam, that Mr. Murphy be asked to represent the Association at this year's U.P.A.S.I. meeting. On Mr. Murphy's consenting, this was carried unanimously and a vote of Rs.150 recorded towards his expenses.

With a vote of thanks to the Chair the meeting terminated.

(Signed) J. J. MURPHY, *Chairman*.

(„) J. R. VINCENT, *Hon. Secy.*

COFFEE.

Coffee Production and Consumption.

Although coffee-houses flourished in London long before tea-rooms, yet after tea really got hold of the public taste it rapidly outstripped coffee as a popular drink. . . . The first coffee-house in London was opened in the days of Cromwell, in 1652.

These establishments rapidly grew in the public favour, and in Charles II's times as many as 3,000 were supposed to exist in London alone. It was in one of these coffee-houses, situated in Lombard street, and owned by one Edward Lloyd, that the present Corporation of Lloyd's had its origin. The London shipping merchants used to meet there to discuss business matters, and out of their informal discussions the vast marine insurance organisation grew up.

The Dutch sent coffee plants to Java in 1650, and in 1723 coffee was first planted in Martinique, whence it gradually spread to the mainland of South America. South America, and Brazil in particular, now produces by far the greater part of the world's coffee supply, and true Mocha coffee is very hard to obtain. The principal coffee-producing countries and the amounts they exported in 1908 are as follows, but it must be remembered that a varying fraction of the total production is retained in each case for home consumption :—

COFFEE EXPORTS.

Millions of lbs.		Millions of lbs.	
Brazil	... 1,639	Mexico	... 47
Venezuela	... 95	Porto Rico	... 38
Columbia	... 76	India	... 37
Haiti	... 64	Costa Rica	... 33
Guatemala	... 61	Nicaragua	... 19
Salvador	... 55	Other Countries	... 14
Dutch East Indies	... 50		

Total 2,228 million lbs., or about one million tons.

These figures show very clearly the predominance of South America. . . .

To turn from the production of coffee to the consumption. The United States absorbs by far the largest quantity; in 1906 they consumed well over eight million cwts. Germany comes next with nearly four million cwts., and then France with about two million, and Austria-Hungary with one. Great Britain drinks comparatively little coffee; in 1906 she only took 200,000 cwts., odd, or about the same amount as Turkey and Norway or Denmark, and she is a long way behind Holland and Sweden. The Cape and British South Africa use more coffee than Great Britain.

If, instead of looking at the totals, we take the average consumption per head of the population, it will be found that Great Britain is very low in the list. The figures run as follows. They are based on averages taken from the years 1899 to 1903. Holland heads the list with a consumption of 18'42 lbs. per head, the United States comes next with 11'07 lbs., and is followed by Belgium with 9'48 lbs., Germany with 6'49 lbs., France with 5'02, Austria-Hungary with 2'11 lbs., Canada with 1'05 lbs., the United Kingdom with '71 lbs., and Australia with '56 lbs. The figures showing the consumption per head of coffee are exactly the reverse of those showing the consumption per head of tea. Australia and the United Kingdom head the list of tea-drinking nations.

The consumption of coffee in England during the last ten years has been fairly constant, as the following figures, taken from the *Public Ledger*, will show :—

	Cwts.		Cwts.
1900	259,937	1905	257,049
1901	283,285	1906	255,228
1902	255,158	1907	260,549
1903	268,284	1908	259,927
1904	256,990	1909	270,813

In England coffee is not drunk much by the working classes. It is not a popular comfort, but a luxury of the well-to-do. On the breakfast tables of the middle classes perhaps more coffee is drunk than tea; and, of course, coffee is the indispensable finale of even a modest dinner. Hence, the sort of coffee drunk in England (though often spoilt in the making) is of very good quality, as the following figures, which are also taken from the *Public Ledger*, indicate:—

HOME CONSUMPTION OF COFFEE.

British East Indian.	Brazilian.	Colombian.	Costa Rica Guatemala, &c.	Other Sorts.	Total.
Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1908 2,579	2,536	1,275	7,720	1,353	15,463
1909 2,618	2,418	1,006	7,874	1,233	15,149

From these figures it will be seen that the countries which send the most coffee here are Costa Rica and Guatemala. Of the 7,874 tons that came from Costa Rica and Guatemala in 1909, 5,525 tons came from the first and 2,349 from the second. Costa Rican coffee is of a very fine quality, and correspondingly expensive. England is Costa Rica's best customer with regard to coffee, in fact, over half the Costa Rican coffee crop comes to this country.

Coffee has probably been subject to more adulteration than either tea or cocoa. In George I's time an Act was passed to prevent "divers evil disposed persons who at the time of, so soon after, the roasting of coffee made use of water, grease, butter, or suchlike materials whereby the same is rendered unwholesome." Since that time there have been a whole series of Acts dealing with the adulteration of coffee. Among the various substances used for the purpose, chicory is the best known and the most respectable, but cereals, sawdust, bark, cacao husks, acorns, figs, lupine, peas, &c., have all played their part, and even the lately discovered soya bean has been adapted.

During the last twenty years the price of Costa Rican coffee, which affects the British consumer most, has decreased by nearly 50 per cent. This decrease took place between the years 1890 and 1900. In 1890 the average price of Costa Rican coffee sold at the public sales in London was 98s. 6d. per cwt., in 1899 it was 61s. 9d., and since that date it has been fluctuating between 51s. and 55s. per cwt. It should be observed, however, that the price in 1890 was abnormally high owing to short crops.

This fall in price has naturally led to a cry of over-production in the coffee trade during the last few years, and the coffee planters of Santos and San Paulo coffee have raised loud complaints. Readers of the *Economist* will remember the ill-fated "Coffee Valorisation" scheme of the Brazilian Government, which created such a sensation a couple of years ago. The Brazilian crop for the season 1906-7 was estimated at four to five million bags in excess of the consumption of that sort of coffee; so in hopes of maintaining the price the Brazilian Government bought up several million bags of the coffee in order to hold them over for a year or two until the demand and supply were more equal. The scheme failed, as might have been expected, and the surplus coffee was finally taken over by trustees who represented the various Continental banks that had advanced money to the Brazilian Government. This coffee is gradually being unloaded on to the market, but a large amount still remains in stock. The menace of this vast supply which is being held in reserve is seriously handicapping the Continental coffee buyers, as they do not dare to buy large stocks lest there should be a heavy fall in price. The English coffee merchants are more or less free from this overhanging terror, as the conditions of the Costa Rican coffee trade are normal, and Brazilian coffee, for some reason or other, does not appeal to the English palate.—*Economist*.

Coffee Trade of Havre.

The imports of Brazilian and Central American coffees of 1909 show a considerable increase on those of 1908, especially in taking into consideration the amount of coffee unloading on December 31, 1909—211,500 bags against 61,000 bags on December 31, 1908, whereas the arrivals of Haytian coffees show a decline, which decrease is due to the importance of the crops, the Haytian one having been very much below the level in 1908-09.

Below will be found statistics of the Brazilian crops (in bags) and those of other countries during the past six years :—

Year.	Brazilian Production.	Production of other countries.	World's Production.
1903—04	11,101,000	4,891,000	15,992,000
1904—05	10,523,000	3,923,000	14,446,000
1905—06	10,844,000	3,948,000	14,792,000
1906—07	21,190,000	3,596,000	23,786,000
1907—08	11,001,000	3,861,000	14,862,000
1908—09	12,912,000	4,030,000	16,915,000

BRAZILIAN PRODUCTION.

Year.	Santos.	Rio.	Bahia and Victoria.	Total.
1903—04	6,395,000	4,020,000	686,000	11,101,000
1904—05	7,426,000	2,542,000	555,000	10,523,000
1905—06	6,983,000	3,244,000	617,000	10,844,000
1906—07	15,392,000	4,234,000	564,000	20,190,000
1907—08	7,203,000	3,108,000	690,000	11,001,000
1908—09	9,533,000	2,883,000	496,000	12,912,000

The actual output of the world in 1908-09 (deducting re-exports) was 18,227,000 bags, against 17,110,000 bags in 1907-08 and 17,108,000 bags in 1906-07.

Prices, which were at 40 fr. (£1 12s.) for good average Santos at the commencement of the year, increased to 46 fr. (£1 17s.) during the month of April, on account of the stoppage of Brazilian exports from the beginning of March; then dropped to 40 fr. (£1 12s.) for near futures and 38 fr. (£1 10s. 4d.) for distant, being influenced by advices concerning the Brazilian crop 1909-10, which was represented as being much larger than the previous one. After the month of August, in spite of heavy receipts in Santos, due to the assiduity shown by the planters to ship their coffees (the export of coffee from the State of San Paolo being limited to 9,500,000 bags for the whole season), advices arrived stating that the yield of the crop was not as good as expected. On the other hand the August, September and October flowering was not so good, in fact it became almost certain that the crop of 1910-11 would be but moderate or even small.

Influenced by these advices, prices gradually advanced until 48 fr. (£1 18s. 8d.) and 49 fr. (£1 19s. 6d.) in November were reached.

The deliveries from this port in 1909 have been very satisfactory, showing an increase of nearly 200,000 bags on those of 1908. The increase is shown equally by the re-exports and deliveries to the French consumer. The following table shows the "duty-paid" coffee in France since 1905 :—

	Total	Of which Brazilian.
1905	1,515,000	749,000
1906	1,615,000	831,000
1907	1,695,000	892,000
1908	1,715,000	940,000
1909	1,785,000	1,060,000

SOILS.**THE MAKING OF SOIL.**

In "Scenery, Soil and the Atmosphere," in the *Popular Science Monthly*, Professor Albert Perry Brigham, Colgate University, writes, *inter alia* :—

"The making of soil is a complicated process, or bundle of processes. Fundamentally it is due to the breaking down of rocks, and this is effected by change of temperature, by organisms, by the wear of running streams, glaciers and ocean waves. But when the rocks are broken down, processes more intimate and essential must be added. These more intimate agencies are the water, the atmosphere and decaying organisms. The water will accomplish solution and thus make certain minerals available for the nutrition of crops. But the water falling as rain has gathered from the atmosphere minute portions of its carbon dioxide, and has become thereby an effective dissolving agent. Most rocks contain more or less iron in a disseminated condition. The oxygen of the air combines readily with this metal, promoting the decay of the rock mass, and colouring not only the rock, but the soils that ultimately come into being. When the farmer selects a field to lie fallow he stirs the soil, gives it all possible exposure to air, water and heat, and thus speeds these silent processes which go on in some measure everywhere, with or without his ken. It is the time required to produce these fine results, that makes wanton destruction of soils criminal and points the rebuke to public authorities and legislative bodies, when they halt at reasonable measures of conservation. We cannot grind rocks in a mill and make soil. The operation is at once too large and too delicate, demanding the silent intervention of mechanical and chemical forces, of atmosphere, water, heat and life, through long periods of time.

"When the land has suffered a glacial invasion, much of its ancient soil has been lost in the sea, and such as remains is moved from its place and mixed with a large body of drift, mechanically broken from fresh bed rock. This latter material is not soil until it has been subjected to the atmospheric and vital processes which fit it for its function of mediation between the rocky planet and the plant life of the world.

"In a non-glacial region, all the soils, save along rivers, or on steep slopes, have been formed by the decay of the bed rocks in place, and this decay does indeed, and fortunately, in favoured regions, proceed swiftly. It may be some compensation for people subject to disaster on the slopes of Vesuvius, or Etna, that the friable lavas and ash, in that genial climate, speedily become soil. On a lava stream still warm, at the foot of Vesuvius, baskets of earth, suitably spaced for vines, have been deposited, and the lava itself in a year or two will be hospitable to the roots."

RUBBER CULTIVATION IN INDO-CHINA.

The *Quinzaine Coloniale* (Paris) of 25th May, in the course of an article on the cultivation of rubber in Cochin-China, states that there is likely to be considerable development in the rubber industry in Cochin-China. Attempts at the cultivation of rubber were made there as far back as 1897 and 1898, but it is only within recent years that the matter has been taken up in real earnest. There exist at present about 15 plantations comprising 650,000 *hevea* plants. Most of these plantations are, it is true, still in the first stages of development, but their area is being extended further every day, and it is estimated that by the end of 1910 there will be about one million plants in existence.

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THE U. P. A. S. I.

(INCORPORATED.)

The Annual Meeting, 1910.

In connection with this meeting it is proposed to hold—at the U.P.A.S.I. office on Wednesday, August 3, and Thursday, August 4, from 7-30 to 9-30 a.m.—a small Exhibition of Produce Samples and of Herbarium Specimens of Leguminous Plants. Tea Samples will be tested and judged on the same days.

The term "Exhibition" is a somewhat pretentious one to use in this connection, as the display will be "in miniature;" but it is hoped that future years will witness an expansion along the lines now laid down.

A few specimens of Rubber and Tea have arrived already.

The "Planting Member."

The Hon'ble Mr. J. G. Hamilton arrived in Bangalore on July 28, and has since then been attending office and consulting with the Chairman.

The Planters' Association of Ceylon.

It is announced that the Committee of the above Association has decided to ask Mr. H. A. Beachcroft to represent the Association at the Annual Meeting of the U. P. A. S. I. The selection is an excellent one, more especially in view of the fact that Mr. Beachcroft was Chairman of the P. A. of C. at the time when it was arranged that Mr. George Romilly should attend one of its Committee's Meetings on behalf of the U. P. A. S. I.

Singapore Agri-Horticultural Show.

A letter from the Honorary General Secretary states that two Cups of \$100 each are offered for the two best samples of Rubber produced and manufactured outside the Straits Settlements or the Federated Malay States.

Trial of Sprayers.

Early last month Messrs. Oakes & Co., Ltd., of Madras, kindly sent three Knapsack Sprayers for the Scientific Officer to experiment with. These were:—

1. Gould's Sprayer, price Rs.60-0-0.
2. Vermorel Eclair, „ „ 37-8-0.
3. Four Oaks, „ „ 47-8-0.

Mr. Anstead reports that of the three the "Four Oaks" is by far the best. He describes it as a cheap, handy sprayer with a pump *outside* (so that working parts can be easily got at for repairs); and as easy to use.

It is also very highly recommended by Mr. Maxwell Lefroy, the Imperial Entomologist, and is of English make.

Nos. 1 and 2 are perhaps better known—No. 3 having been placed on the market more recently—but are not considered so good.

Gould's is regarded as likely to be too easily broken for coolly use; the connecting rods to the pump may be easily bent or broken.

Vermorel Eclair is better, but the pump is difficult to get at without a lot of unscrewing; and the rubber parts of the pump are not likely to withstand climatic influences.

Mr. Anstead lays stress on the need for a durable article, the working parts of which are readily accessible for repair or adjustment. *For the money*, he says, the "Four Oaks" is as good as the "Deming Success" Sprayer, which need not now be considered further, especially in view of Mr. Lefroy's strong recommendation.

The S. I. P. B. F.

The Honorary Secretary, Shevaroy Planters' Association, writes that the Rs.20 entered in the name of that Association in last week's issue (p. 322) was really subscribed through it as follows:—

Mrs. Gaitskell	...	Rs.10.
Mr. F. D. Short	...	„ 10.

The late Mr. J. B. Carruthers.

On the 21st instant Reuter cabled the sad news of the death of Mr. J. B. Carruthers, formerly Mycologist and Assistant Director of Botanic Gardens in Ceylon, then the first Director of Agriculture (and Government Botanist) in the Federated Malay States, and finally Assistant Director of Agriculture at Trinidad. A brief sketch of the career of this able scientist is given below:—

John Bennett Carruthers, F. R. S. E., F. L. S.; Assistant Director of Agriculture, Trinidad, since 1909. Born 19th January, 1869; son of W. Carruthers, PH. D., F. R. S., F. L. S., F. G. S.; married Frances Helen Louise, daughter of the late A. B. Inglis of Calcutta, and Edzell, Forfarshire. Educated: Dulwich; Greifswald (Prussia) University. Demonstrator of Botany, Royal Veterinary College, London, 1893; Professor of Botany, College of Agriculture, Downton, Hants, 1895; employed on special mission by Colonial Government and Ceylon Planters' Association to investigate a serious disease of the cacao tree, 1899; discovered the fungus causing the disease, and laid down measures for its prevention and cure, which have been generally adopted; appointed by Mr. Chamberlain, Government Mycologist and Assistant Director, Royal Botanic Gardens, Ceylon, 1900-05; Director of Agriculture and Government Botanist, Federated Malay States, 1905-09. Publications: numerous papers on algæ, mycology, plant pathology, etc., in Journals of Linnean Society, Royal Agricultural Society, Royal Horticultural Society, and in Tropical Agriculturist, Contemporary Review, etc., Recreations: Ten years active member of London Scottish Rifle Volunteers, and played football for some years for London Scottish Football Club and Middlesex County. Clubs: Royal Societies, Savile.

It is understood that the cause of death was pneumonia, supervening upon an operation.

In Ceylon, Malaysia and the West Indies Mr. Carruthers rendered very valuable help to planters; and though he had no direct connection with planters in Southern India references to his writings and remarks appeared at times in *The Planters' Chronicle*, and in an indirect way the planting community of India undoubtedly profited by his labours in other fields.

Scientific Officer's Papers.**XXXVII.—A MANURIAL SCHEME FOR COFFEE.**

A correspondent recently submitted soil analyses, and asked for advice about a manurial system to be based on them. As these analyses are probably more or less typical of the soils in some coffee growing districts, the recommendations made are reproduced here as being of general interest to Coffee planters.

The essential parts of the analyses were as follows :—

	I.	II.	III.
Water ...	11'70	10'25	4'01
Organic matter ...	15'90	15'84	12'80
Nitrogen ...	0'30	0'40	0'25
Alumina ...	11'81	4'83	10'78
Ferric Oxide ...	17'60	3'20	2'56
Lime ...	1'01	1'04	0'70
Magnesia ...	0'50	0'50	0'48
Potash (and Soda) ...	0'41	0'49	0'35
Phosphoric Acid ...	0'09	0'15	0'10

No. I, elevation of 3,300 feet, is a red soil containing a lot of Iron and Alumina, a fair quantity of organic matter, but a small amount of phosphoric acid. The lime content appears fair, but it was reported to exist chiefly as a Silicate and not as Carbonate. Under these circumstances Phosphoric acid, which is chiefly needed by the soil, has a tendency to combine with the Iron and Alumina in an insoluble form so that it is lost to the plant, instead of with the lime in a soluble form as it should do. The analysis therefore plainly indicates that lime is needed, and that basic phosphates should be applied in preference to acid ones.

No. II, elevation 3,500 to 3,700 feet, is a dark coloured, easily light working soil, containing much less Iron and Alumina, and a good deal of organic matter, while the phosphoric acid content is much higher than in the case of No. I. The lime is again reported to be present chiefly as Silicate.

No. III, elevation 3,500 to 3,700 feet, is a loamy soil, poor in organic matter, which possibly accounts for it holding so little water, and deficient in Phosphoric Acid, the Potash content also being lower than in the case of Nos. I and II. The Lime is also low, and the soil is altogether a poor one, Nitrogen being particularly needed. It is significant that Stump Rot was reported to be bad in this field.

In considering a manurial system the rainfall of the district must be taken into account. This may be divided into three distinct periods. From November to March there is a dry period, in April and May, and again in September and October, there is a period of light rains, and from June to August there is heavy rain and the typical monsoon period.

Soluble mineral fertilisers should be applied just before the periods of light rain, that is in March or in September, the former probably being the better time.

The manurial scheme recommended was as follows :—

No. I

1. Dry season, February or March, an application of 2 tons per acre of Slaked Lime. (See *P. C.*, Vol. IV., p. 314).

2. March. Basic Slag at the rate of 4 cwt. per acre, or Basic Superphosphate at the rate of 6 cwts per acre.

October or November. Nitrate of Soda at the rate of 1 cwt. per acre.

3. A general fertiliser, the soluble minerals applied in March and the bulk in September.

4. Lime again as in the first year.

No. II.

1. Lime as in No. I.

2. A general fertiliser, the soluble minerals containing Potash and Nitrogen in March, bulk containing Phosphoric acid and Nitrogen in September.

No. III.

1. March. Saltpetre at the rate of 2 cwt. per acre.

September. Poonac or Fish.

2. March. Sulphate of Potash and Basic Slag in the proportions, Sulphate Potash 1, Basic Slag 2, and dry earth or jungle soil 2.

3. Lime as in No. I.

This scheme can obviously be modified and varied in several ways, for instance, in the 2nd year in No. II Superphosphate and Sulphate of Potash might be applied and the Nitrogen omitted, if it is considered that there is sufficient Nitrogen in the soil. The necessity for applying Nitrogen, and the amount which should be applied, depends to a great extent on the condition of the mulch on the surface, and whether green dressings are grown or not.

Matters should be arranged so as to work in a systematic way, and supposing these three fields to represent the whole estate, to lime a third of it each year.

Thus the first year No. I would get treatment 1, No. II treatment 2, and No. III treatment 1; the following year No. I would get treatment 2, No. II treatment 1, No. III treatment 2; the third year No. I would get treatment 3, No. II treatment 2, and No. III treatment 3, and so on.

RUDOLPH D. ANSTEAD,

Planting Expert.

FUNTUMIA ELASTICA.

The Funtumia as a cultivated tree has had but little reputation as a high-class rubber-producer both in the matter of returns and in its product (says the "Agricultural Bulletin of the Straits Settlements.") We are glad to see signs that it is not so bad as its reputation. A note in the "Indian Rubber Worlds" from Mr. J. W. Johnson, manager of the Mabira Forest Rubber Company, Uganda, states that Funtumia rubber has fetched recently as much as 6s. 4½d. per lb., the third highest price in the market. He hopes to so improve this rubber that it will top the best Pará. The above estate turned out 10,000 lb. of rubber in 1907, and 35,137 lb. in 1908 and 26,000 lb. in the first six months of 1909.

RUBBER IN FORMOSA.

The prospects for rubber planting in South and Mid-Formosa are said to promise well. Wild rubber trees abound in some of the mountainous districts, and recently experiments in tapping these have been made. The juice extracted has been sent to Japan, where it is pronounced of good quality and of undoubted commercial value.

In the Ako district, the authorities are experimenting in a small way, and a number of plants of the "Ficus Flastea, Roxb." are being raised for the purpose. Applications are said to have been sent in to the authorities for grants of uncultivated land for rubber plantations, and these are now under consideration.

DISTRICT PLANTERS' ASSOCIATIONS.**Central Travancore Planters' Association.**

Proceedings of a General Meeting of the above Association held at Caradygoody Bungalow on Saturday, the 9th July, 1910, at 10 a. m.

PRESENT :—W. H. G. Leahy (Chairman) R. P. Roissier, J. A. Richardson, D. McArthur, T. C. Forbes, T. A. Vernon, E. S. Stephens, B. Wolde, C. W. Lacey, T. A. Kinmond, F. Bissett, J. S. Wilkie, E. C. Sylvester, J. H. Cantlay, J. F. Fraser, H. C. Westaway (Honorary Secretary) and R. Leshar (visitor).

The notice calling the meeting having been read, the Chairman said :—

Gentlemen,—Before we proceed with the ordinary business of this meeting I have a sad duty to perform and would remind you that this is our first meeting after the death of His Majesty King Edward VII. I am sure it will be the general wish to place on the records of this Association a resolution of sympathy in the great and unexpected loss the Nation has suffered through the death of our late King, and to record our loyalty to King George V. The very sad news of His late Majesty's sudden death came as a great shock to us all, and made not only the British Empire but the whole world sad, at the loss of a Monarch who worked not only for the peace and prosperity of his own subjects, but for that of the world in general; and how well he succeeded is too well known to us all. It is unnecessary for me to recall to your memories the many and eloquent tributes to his character which his death called forth from all quarters of the civilized world, and there is no doubt whatever that the greatest of his attributes was that he always "played the game" whether in his rôle of King, all round sportsman, or gentleman, which made him so popular with his own loving subjects, and called forth the admiration of foreign countries. I am sure no further words are needed from me to commend to you the resolution I am about to propose, and it is, "That this Association records with feelings of heartfelt sorrow the death of His Most Gracious Majesty King Edward VII, and in tendering its sincere condolence to the Members of the Royal family in their irreparable loss, desires to convey its devoted loyalty to His Majesty King George V.

This was passed in silence, all members standing.

The minutes of the previous meeting was then taken as read and confirmed.

Correspondence—Mannans Creek Bridge.—Read letter from Chief Engineer. Proposed by Mr. Wolde and seconded by Mr. Kinmond "that the Secretary do apply to Government for a grant for a new iron girder bridge over Mannans Creek river. Carried unanimously.

Theni Bridge.—Read telegram from the Collector of Madura in reply to Honorary Secretary's letter of the 22nd June, when Mr. Richardson informed the meeting that he had met the Hon. Rama Bhudra Iyer, member for Periakulam, and explained that they meant to send a deputation to wait on His Excellency the Governor of Madras. The Hon. gentleman said he would be willing to form one of such a deputation. He had received four memorials drawn up by inhabitants of the Cumbum valley, which had been sent to him at the request of the Kanan Devan P. A. to be handed to His Excellency. These memorials would have to be sent in, and he would find out through whom they should be sent and to whom addressed. Unfortunately Mr. Hamilton was unable to form one of the deputation and he (Mr. Richardson) proposed that, even if the Collector's reply was not quite satisfactory, the deputation should be postponed till after the U. P. A. S. I. meeting in the hopes of Mr. Hamilton being then able to join it. He further pointed out that he wanted to state clearly our reason for this step, as

he did not wish the K.D.P.A. to be able to turn round and say that we had postponed the deputation solely on account of the correspondence with the Collector. But if his (the Collector's) reply was unsatisfactory then the matter must be pushed forward as much as possible either before or after the U. P. A. S. I. meeting. It was resolved, "That on the receipt of the Collector's letter it be circulated to the Committee, and should they think it unsatisfactory, that they proceed at once to take the necessary steps to form the deputation, the delegates being Messrs. Richardson, Martin and Mr. Hamilton, and member for Periakulam."

Kumili-Kottayam Road.—Read letters from Chief Engineer.

Uthamapalayam-Kumili Road.—Mr. McArthur pointed out the disgraceful state of this road, which had caused cart hire to go up. Resolved, that the Honorary Secretary do write to the Madura District Board and Irrigation Department pointing out the disgraceful state of the road.

Cardamom Hills Road.—Read letter from Chief Engineer granting Stagbrook Estate Rs.500—0—0 for the up-keep of their private road and bridges over which the traffic is now diverted, owing to the dangerous state of the bridge at the 2nd mile.

Benevolent Fund.—Read letter from U. P. A. S. I. regarding offer made by Mr. Hamilton. The meeting was informed that Mr. Acworth had given Rs.500—0—0 and Messrs. Peirce, Leslie & Co., Ltd., Rs.250—0—0. It was resolved that the Honorary Secretary circularize the other coast firms who were previously omitted.

Read Honorary Secretary's letter to the Chief Secretary to Government regarding abuse of timber.

Read letter from S. T. P. A. on the same subject, and the Association supported them in the action they were taking.

Read letters from Conservator of Forests regarding elephants doing damage, in reply to the Association's resolutions at last meeting. Resolved to await the reply to the Honorary Secretary's letter.

Read Honorary Secretary's letter regarding License for Fairfield Shop. Resolved that Honorary Secretary do write again asking for a reply.

Read letters from the U. P. A. S. I. regarding laboratory. It was proposed by Mr. Bissett, seconded by Mr. Lacey, "that the Bangalore delegate be empowered to give a donation towards the expenses of the Laboratory for the Scientific Officer." Carried unanimously. It was also proposed by Mr. Wolde and seconded by Mr. Sylvester, that our delegate be allowed after seeing what other Associations are doing to increase the subscription at his discretion. Carried unanimously.

Green Tea Bonus.—Read letter from S. T. P. A. Nothing was done regarding this.

Fitter Fund.—Read letter from the fitter asking for a lathe and planing machine. Resolved to leave it with the Fitter Committee.

Labour Rules.—The Chairman said he regretted to say that one of the members had resigned from the Committee, but he thought that rules were absolutely necessary, but that those which the Committee had made and which had been circulated were open to alteration or amendment as the members thought fit. After some discussion it was proposed by Mr. Richardson and seconded by Mr. Forbés, that for one year the rules be passed as they stand, with the exception that the last clause be deleted and that the previous rules be cancelled from 9th July. Any existing disputes to be settled under the old rules.

Medical Scheme.—As the Manager of the T. T. E. Co., and the Superintendent of Caradygoody Estate could not give a decided answer as to whether they would join or not till they heard from Home, it was resolved

that this scheme be brought up at the extraordinary general meeting to be held on August 27, 1910.

Read letter from Mr. Richardson *re* the letter in which the Government had asked him to become a non-official member of the Travancore Legislative Council. The meeting congratulated Mr. Richardson on his appointment.

Read letter from Messrs. Oakes & Co., Ltd. Resolved that the Honorary Secretary do write and give them figures of acreages, and that it must be left to them to decide whether they think it worth their while to put a Resident Engineer in Travancore.

Read U. P. A. S. I. circulars No. 14/10, 19/10.

do do do No. 24/10.

do do do No. 28/10. Resolved that the Honorary Secretary do write and reply that there are no cases.

Bangalore Delegate.—It was proposed by Mr. Forbes, seconded by Mr. Fraser, that Mr. Leahy be appointed delegate to the U. P. A. S. I. Carried unanimously.

Mr. Leahy said :—"Gentlemen, I thank you for the honour you have done me; as it seems the general wish of the Association that I should be your delegate I shall have much pleasure in accepting and will do my utmost to carry out your instructions."

With a vote of thanks to the Chair the meeting terminated.

(Sd.) H. C. WESTAWAY, *Hon. Secretary.*

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Cochin & North Travancore Planters' Association.

The first Annual General Meeting of the above Association was held on the 14th May, 1910 at the Trichur Club, by kind permission of the Honorary Secretary and Committee of the Trichur Club.

PRESENT :—Messrs. R. G. DeRoos Norman, E. F. Barber, H. B. Kirk, C. Lake, R. L. Gudgeon, G. R. R. Parker, R. DeRoos Norman, E. C. Walker.

Honorary Members.—Dr. G. N. Coombes, Chief Medical Officer, Mr. E. H. Johnstone, Conservator of Forests.

Visitors.—Revd. Father Elias Pelly, and Mr. Kidd.

Chairman.—Proposed by Mr. Gudgeon and seconded by Mr. Lake, that Mr. Barber do take the chair.

The Chairman then proposed that the telegram of condolence to the Governor of Madras at the death of King-Emperor sent by the Honorary Secretary be agreed to. This was unanimously done.

(1.) *Rules.*—Proposed by Mr. Kirk and seconded by Mr. Gudgeon, that the Cochin Planters' Association be in future called the Cochin and North Travancore Planters' Association. Carried.

With the exception of a few alterations chiefly proposed by Mr. Lake and seconded by Mr. Kirk, the rules proposed at the general meeting held in March 5th were adopted.

(2.) *Rates.*—Proposed by Mr. Lake and seconded by Mr. Norman, that the rate of coolies' pay be discussed with a view to creating standard wages for local and imported labourers, to be binding on all Estates connected with this Association. This went in to the Committee, and it was afterwards proposed and seconded by some people, that no more than 5 annas per man and 3½ annas per woman be paid for imported labour on the Estate and 10% commission to the Maistry. This was thrown out on the grounds that if it was found necessary for the Estates to go further afield (say on the South-East Coast) for their labour the same rates would have to be offered to the coolies as other Estates are prepared to offer them.

(3.) Mr. Parker proposed and Mr. Kirk seconded, "that the Association do subscribe to the Southern India Planters' Benevolent Fund." Agreed that Rs.50 be paid by the Association to this fund.

Mr. Parker proposed that the Cochin Government be approached in regard to lessening the existing difficulties relating to the importation of Arms and Ammunitions. He was asked to withdraw this until the next General Meeting.

(4.) *Writer*.—Mr. Kirk proposed and Mr. Barber seconded, "that the Honorary Secretary be allowed Rs.10 per mensem as pay for his writer doing the Association accounts, etc., and that the Committee have power to increase this amount whenever they consider the work necessitates such increase." Carried unanimously.

(5.) *Chairman*.—Mr. Lake proposed and Mr. Kirk seconded, that Mr. Barber be appointed Chairman for the year. Carried unanimously.

(6.) *Scientific Officer's Fund*.—Proposed by Mr. Barber and seconded by Mr. Gudgeon, that the Cochin and North Travancore Planters' Association do subscribe Rs.100 per annum to the Scientific Officer's Fund. Carried unanimously.

(7.) *United Planters' Association*.—Proposed by Mr. Barber and seconded by Mr. Lake, that the Honorary Secretary be instructed to write the Secretary U. P. A. S. I. offering a minimum subscription to join the U. P. A. S. I. for the present year. Carried unanimously.

Proposed by Mr. Kirk and seconded by Mr. Lake, that Mr. Gudgeon be asked to represent this Association at the U. P. A. S. I. General Meeting to be held next August. Mr. Gudgeon agreed, and it was carried.

(8.) Mr. Gudgeon was asked to continue to be the Honorary Secretary; and the following members were voted on the Committee for the year:—Messrs. E. F. Barber, Chairman; R. L. Gudgeon, Honorary Secretary; H. B. Kirk; C. Lake; R. De Roos Norman.

A vote of thanks was proposed to the Honorary Secretary of the Trichur Club. The Meeting was then closed.

(Sd.) E. F. BARBER, *Chairman*.

(,,) R. L. GUDGEON, *Hon. Secretary*.

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Anamalai Planters' Association.

Proceedings of the Half-Yearly Meeting of the Anamalai Planters' Association, held at Puthutham Bungalow on Wednesday, 20th July, 1910.

PRESNT:—Messrs. A. C. Cotton, H. W. deSalis, J. H. Jones, G. A. Marsh, A. H. Sharp, E. W. Simcock, E. B. Tapsell, R. F. Vinen, J. O. K. Walsh, C. H. Brock (Vice-Chairman) and G. L. Duncan (Acting Honorary Secretary.)

Visitors.—Messrs. A. W. Brodie and J. E. Scott.

1. *Chairman*.—The Chairman having resigned, the Vice-Chairman presided at the Meeting.

2. *Proceedings of Last Meeting*.—The Minutes of the Proceedings of an Extraordinary General Meeting, held on 2nd June, 1910, were read and recorded after previous circulation.

3. *Delegate to Bangalore*.—Proposed by Mr. Marsh and seconded by Mr. Duncan, that Mr. C. H. Brock be elected as the Association's Delegate at the General Meeting of the U. P. A. S. I. to be held at Bangalore on the 1st August.

4. *U. P. A. S. I. Agenda Paper*.—The Meeting then proceeded to discuss the subjects on the Agenda and to instruct their delegate.

(a.) *Scientific Officer*.—Mr. Marsh proposed and Mr. Sharp seconded,

"That this Association is not in a position to increase its subscription to the Scientific Officer's Fund."

The following amendment was proposed by Mr. E. W. Simcock and seconded by Mr. deSalis and carried unanimously:—"That this Association's subscription to the Scientific Officer's Fund be raised and be levied on an acreage basis of 3 pies per acre per annum on all cultivated area for a period of three years."

The delegate was instructed to support the establishment of the proposed laboratory provided the promised subscriptions to the Scientific Officer's Fund were sufficient to cover the yearly expenditure involved, and that the initial outlay on the same be met out of the U. P. A. S. I. Funds.

The delegate was to ask for Mr. Anstead to visit the District any time between December and May.

(b.) *Finance*.—The subscription to the U. P. A. S. I. for the coming year was to be on 7,459 acres of cultivation.

(c.) *Prevention of Thefts of Tea*.—The delegate was instructed to press on with this subject, and to ask for all Plantation Products to be protected by legislation on the lines of the Coffee Stealing Act.

(d.) *Labour Problems*.—The delegate was instructed to again urge the necessity of Registration for Plantation Labour, and to make every endeavour to get some move made to cope with the rapidly increasing labour difficulties.

(e.) *Planters' Benevolent Fund*.—It was announced that seven Members had promised Rs.40 per annum for five years, and that six subscriptions of Rs.10 per annum had also been promised.

5. *Labour Rules*.—Read letters from Mr. Sharp, dated 15th June 1910, and from Mr. deSalis, dated 17th July. After considerable discussion both letters were withdrawn.

The Meeting then discussed a contention between Messrs. Simcock and Brock with reference to Contractors' coolie-maistries. The Meeting could arrive at no agreement as how to revise the present labour rule so as to include Contractors' coolies.

6. *Branch Roads*.—Read and recorded letter from the Government of Madras, P.W.D., No.3249 dated 7th July 1910, and enclosures with reference to the Kalianapandal Road.

Mr. Simcock requested that the matter be left open till the next General Meeting, as the letters read necessitated some alteration in the remarks he had intended to make to the Meeting on this subject.

The following resolution, proposed by Mr. deSalis and seconded by Mr. Simcock, was carried unanimously:—"That the Acting Honorary Secretary write to the Executive Engineer, Coimbatore, drawing attention to the disgraceful state of the Bridle Paths from the foot of the Ghaut to the 19th Mile of the Main Road, and of the various Branch Bandy Roads in the District.

7. *Further Grants of Land*.—Read letter from the Collector of Coimbatore, No.585 dated 19th June, 1910, and two other letters enclosed, opposing the Resolution passed at the last General Meeting.

Mr. Marsh, after replying to the statements put forward in those two letters, proposed the following resolution:—"That the Chairman reply to the Collector detailing the points in Mr. Marsh's remarks against the arguments laid down in the letters that had been read." Mr. Sharp seconded. The resolution was strongly opposed by Messrs. Duncan and Simcock, and this led to a lengthy debate. On the resolution being put to the Meeting it was carried by three votes.

8. *New Member*.—Mr. Brock proposed and Mr. deSalis seconded, that Mr. E. B. Tapsell be elected a Member of the Association.

(Sd.) C. H. BROCK, Vice-Chairman,

CORRESPONDENCE.

Hybrid Coffee.

Saklaspur, 22 July, 1910.

Dear Sir,—I noticed with interest your remarks *re* hybrids in the *Planters' Chronicle* of the 25th ultimo. This is a subject I have had at heart for the past twenty years, and on my Dad Lackoonda Estate possess some very fine specimens of the Liberian-Coorg variety of the third generation. The block originally numbered 750 plants, but half of that number have been cut out as approximating to the Liberian type; those that remain more resemble the Coorg in foliage, but are very luxuriant in growth, and of great size, and appear free from leaf disease. In regard to cross-fertilisation, I have made no experiments this way, leaving it entirely to nature and with, as far as I can see, quite satisfactory results. The trees are not altogether uniform, but are a vast improvement on the parent trees and crop heavily. In addition to the above, I have about 3,000 young plants in their third year that look most promising; some have crop on them. Even with these, although it is the fourth generation, I find a tendency to sport, and a number will have to be eliminated.

I have had the Coffee from these trees valued at Havre, Bordeaux, and Marseilles at from 55 to 65 francs per cwt., and in London at from 55 to 60 shillings per cwt.; as the samples were prepared in native fashion this appears satisfactory. One of these valuations was accompanied by an order for 40/50 tons of this Coffee, but, needless to say, this order could not be accepted.

I would add that this hybrid is extremely hardy and will live and flourish under conditions, and in soil, that Coorgs would refuse to live in; it likes shade, however. It does not seem to require either handling or pruning, and the minimum of attention otherwise.

(Signed) J. G. H. CRAWFORD.

A Costa Rica report about Coffee states:—The excessive wet weather in October 1908 gave rise to a stained appearance in some of the grains when cleaned; about 8 per cent, of the coffee grown in the districts of the interior was thus affected, but, on the Atlantic slope, where the weather was drier, this defect was absent. Careful investigation has shown that these stained grains were not so affected as the result of disease, but as the result of faulty development of the silverskin within the berry, due to excessive moisture in the soil. It is of interest to note that, the weather having been normal in 1909, during the time in which the development of the berries takes place, no stained grains have appeared in the 1909-10 crops.

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The following information is from the report by the British Acting Vice-Consul at Beira (Mr. Hirst) on the trade of that district in 1909:—

There has been a considerable increase in the production of rubber. Landolphia is the only variety exported to any extent, but both Ceará and Pará rubber trees have been planted and carefully attended to for several years past; many thousands of these trees are now reaching the age and strength when they may be safely and, it is believed, profitably tapped. Experiments have been made by the Director of Agriculture upon the Ceará trees and the results have shown that the latex is of excellent quality, nearly equalling in value the best Pará plantation rubber. There are good prospects of this industry becoming a very important one in the near future.

TEA.**The British Tea Duty.****THE QUESTION OF FISCAL PREFERENCE.**

A Reuter's telegram dated London, July 26, 1910, states :—

On the Budget Resolutions in the House of Commons, Mr. Fitz Alan Hope moved to reduce the duty on tea grown in the Empire to 4d. per lb. as an experiment in Preference.

Colonel Seely said that besides the loss of £1,250,000 to the Exchequer, it was dangerous to assume that any fiscal proposition would be received with gratitude by the Dominions. He deprecated the assumption that their loyalty depended on these systems of taxation. The proposal was of no possible advantage to India or Ceylon from the point of view of Preference. The idea seemed to be that the Colonies said :—"If you do not give Preference, we will not fight your battles," and that the Cingalese contingent would refuse to advance unless they got preference on tea.

Lord Ronaldshay, in seconding the motion, contended that India was badly treated in the matter of Tariffs, especially in cotton.

Mr. Lyttelton said that all Unionists faced the fact that Preference would probably involve a tax on food. The Unionists were pledged to give compensation to the class whom the food tax mainly affected. He quoted the instance of Mr. Lloyd George, who justified heavier burdens on Ireland by the boon of old age pensions. He suggested extending the principle by which the Crown Colonies placed orders for our manufactures in return for our guaranteeing loans. Mr. Lyttelton said that Government were like a gramophone, grinding out the same formulæ without a change of inflection.

Mr. Bonar Law explained that Unionists favoured the motion on political grounds, because it would increase the trade of the Empire and improve relations between different parts.

The motion was rejected by 188 votes to 145.

PROPOSED REDUCTION OF PRESENT DUTY.

Another amendment by Lord Castlereagh to reduce the tea duty to 4d. was rejected by 162 votes to 99.

Ceylon a Free Port for Indian Tea.

The *Times* of Ceylon publishes the following letter :—

"Sir,—It is some 15 years or so ago that the last real agitation took place for the abolition of the Ceylon duty on Indian tea. Fitful correspondence has indeed appeared in local papers, but no genuine effort has been made to re-open this matter of vital importance to the future trade of Ceylon. Eighteen or twenty years ago, when the initial suggestions were published, many of the older mercantile firms, not essentially tea firms, but interested in tea, strongly objected to any change in the Customs duty. A few years later, however, some of them modified their views, and the matter was considered by the Chamber of Commerce and the Government, the latter favourably entertaining the proposals for the total abolition of the duty. The Colonial Secretary of the period had correspondence with the Planters' Association, and this body thrashed out the question and practically vetoed the idea, fearing that teas might be imported and subsequently re-shipped fraudulently described as being the product of Ceylon. The Planters' Association Committee said they knew of one case in which 'a Java tea grower suggested to a Colombo merchant his scheme for sending teas to Colombo for re-shipment with an implication of the Ceylon origin.' Regarding this we would at once say that it has never entered the minds of any Ceylon men to allow 'foreign' teas to come into the Island free, the agitation being solely confined to Indian teas which are on a parity in price

with Ceylons though quite distinctive in flavour. Anyhow, it was evident that, if proper safeguards against fraud could be framed, even the Planters' Association would withdraw their opposition, as they wound up one of their resolutions submitted to Government by insisting that 'no change should be made until an alternative method for the prevention of fraud has been approved of and passed into law.' The Acting Attorney-General of the day was requested to report on the minute and resolution passed by the Planters' Association and the Merchandise Marks Ordinance No. 13 of 1888, but only an indefinite opinion was received, while new questions were propounded by Mr. Ramanathan, resulting in the whole matter being shelved. This was the climax to the agitation of fifteen years or so ago.

"Since then opinions have matured on this as on other subjects. The *personnel* of the Planters' Association has changed, the Chamber of Commerce in 1895 only aggregated some fifty members while to-day its membership is between 70 and 80, strengthened by a large number of firms dealing exclusively in tea, who, with the larger experience gained of Colombo as a port of distribution, see what potentialities there are of making it the greatest blending Emporium in the world. Unique are the facilities for shipping to any and every part of the globe at frequent intervals, which is in itself a striking advantage not even surpassed by London. We also have cheap labour in abundance, and considerably lower storage rents than are current in the capital of England. Some of the best-known and largest tea blending firms are already located in our midst, but their operations are confined to Ceylon tea solely, whereas, if Indian tea is admitted free of duty, their business would soon be doubled or trebled, to the advantage of the grower, the shipping interests and merchants, to say nothing of the native artisan, property owners, and the Port and City of Colombo generally, by reason of increased revenue from shipping on the one hand and additional revenue from taxes on the other. With the materialization of the Lake Scheme and the abolition of the Indian tea duty, the importance of Colombo would be increased tenfold. Who will now take the lead in developing this most important branch of the tea trade? A 'T. Spitter' referred to the subject in a recent issue of the *Times of Ceylon*, and, as he may be a somewhat recent arrival quick to see the potentialities of Colombo, as the tea Emporium of the world, it is timely to give the position as it was left some 15 years ago.—Yours, &c."

July 20th.

"W."

Ceylon Exports.

The total Export of Black Tea from 1st January to 18th July, 1910, according to the Chamber of Commerce Circular, so far as only completed manifests show, is :—

The United Kingdom		60,020,032 lb.
Against same period in	1909	67,529,306 lb.
To all other Countries	1910	34,231,786 lb.
Do do	1909	34,787,536 lb.
Total shipments in	1910	94,251,818 lb.
Do do	1909	102,316,842 lb.

So that our black tea shipments to London during this year are 7,509,274 lb. and to other countries 555,750 lb. below those to same date in 1909; and altogether they show a total decrease of 8,065,024 lb.

The export of Green Tea during the period amounted to 3,291,567 lb. as against 2,898,529 lb. in the corresponding period of 1909 an increase of 393,038 lb.

—*Ceylon Observer*.

The Planters' Chronicle.

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AUGUST 6, 1910.

[PRICE AS. 4.

THE U. P. A. S. I.

(INCORPORATED.)

The Annual Meeting, 1910.

FIRST DAY—August 1, 1910.

A Committee Meeting was held at the Mayo Hall, Bangalore, from 11 a.m. to 12-45 p.m. on Monday, 1st August, and the annual report having been passed and the agenda paper discussed at this opportunity, the Annual Meeting was opened at 3 p.m. There were present Mr. J. A. Richardson, Chairman, Mr. Bernard Malcolm, Vice-Chairman, the Hon'ble Mr. J. G. Hamilton (Planting Member of the Legislative Council of Fort St. George), Mr. R. D. Anstead, B. A., Scientific Officer to the Association, and the following delegates :—

Delegates.

Anamalais ...	...	...	Mr. C. H. Brock.
Central Travancore ...	...	...	Mr. W. H. G. Leahy.
Cochin and North Travancore ...	"	"	Mr. R. L. Gudgeon.
			Mr. E. F. Barber.
			Mr. C. Lake.
Coorg ...	...	...	Mr. E. C. Murray-Aynsley.
			Mr. R. D. Tipping.
Kanan Devan ...	...	...	Mr. Aylmer Ff. Martin.
Mundakayam ...	...	...	Mr. J. J. Murphy.
Nilgiris ...	...	...	Mr. E. F. Barber.
			Mr. W. C. Deane.
North Mysore ...	...	...	Mr. C. Danvers.
			Mr. C. K. Pittock.
South Mysore ...	...	...	Mr. C. Lake.
			Mr. C. J. Hayward.
Shevaroys ...	...	...	Mr. Charles Dickens.
South Travancore ...	...	...	Mr. L. G. Knight.
			Mr. C. E. Abbott.
Wynaad ...	...	...	Mr. A. H. Mead.

Mr. H. G. Parsons attended as an ex-Vice-Chairman.

Among the visitors present during the day were Mrs. Hamilton, Mrs. Anstead, the Misses Munro, Miss Horsley, Dr. Leslie Coleman, Mr. E. Lund, Mr. J. Aird, Mr. P. G. Tipping and Mr. W. W. Hight.

The Late King-Emperor.

The Chairman (Mr. J. A. Richardson) first spoke as follows, all delegates standing until he had finished :—

GENTLEMEN,—As you are aware, this is our first Meeting since the lamentable death of our King and Emperor Edward VII, which cast such a

gloom over the British Nation, and I may say over the whole civilised world. This Association on behalf of the Planting Community telegraphed our sincere condolences with the Queen Mother and other Members of the Royal Family and also expressed our unfailing loyalty to our New King and Emperor George V. No words of mine are needed to add to what has already been written and said of one whose death has ended one of the most glorious lives the world has ever known, and King Edward VII's name will go down to History with the well earned title of "Edward the Peace Maker." I venture to say on behalf of the community that we would take this opportunity of again expressing our continued loyalty to our New King and Emperor and assure His Majesty that as in the past, though a small community, we are ever ready to place our services at the disposal of our King and Country.

Business was then commenced by the Chairman suggesting that the Secretary's Report, passed in Committee the same morning, should be taken as read. Mr. Barber moved and Mr. Dickins seconded a formal vote that this be done, and that the report be adopted. This was carried unanimously.

The report was as follows :—

Annual Report, 1909-10.

This report must be prefaced by a brief reference to an event that occurred during the present year and administered a very severe shock to the subjects of the British Crown throughout the world. By the planting community of South India, as by Englishmen generally, the demise of King Edward VII was doubtless felt as a personal loss as well as a national one. An expression of humble and loyal condolence, as well as of continued loyalty to the Crown, was telegraphed, on behalf of the Association, to His Excellency the Governor of Madras for transmission through the proper channels; but words were powerless to do justice to such a lamentable occasion.

At the Annual Meeting in 1909 it was decided to open and equip a suitable office for the Association and more especially for the use of the Scientific Officer and the Secretary. The premises No. 25, South Parade were occupied in due course, a writer and a peon for the Scientific Officer were engaged, the records of the Association were transferred to the new headquarters, and, though progress was slow and there still remain many details to receive attention, it may be said that all arrangements have been placed on a businesslike footing. Had this not been done, the rapidly developing work of the executive could hardly have been dealt with so as to avoid a heavy accumulation of arrears. Roughly speaking, this work has trebled within the year, the increase being largely due to the coming of the Scientific Officer, which has necessarily caused an increase in correspondence, in the amount of money passing through the books, and, in less marked degree, in the number of personal visits from planters seeking information or desiring to discuss planting affairs.

As at present organized the office arrangements are capable of being widened and adjusted to meet any demand that is likely to be made upon them; and the Scientific Officer and the Secretary are in full accord as to the convenience and the positive advantages derived from joint work "under one umbrella."

Though the Travancore Cardamom Hills Planters' Association must be taken as having dissolved and as having ceased, therefore, to be a member of the U. P. A. S. I., its place on the membership roll was taken towards the close of the year by the newly formed Cochin and North Travancore Planters' Association, temporarily admitted by vote of the Council. The

admission of this Association to permanent membership will no doubt be taken into consideration at the present meeting.

Six gentlemen have availed themselves of the new Rule 7 introduced last year and have received the Circulars of the Association.

In the interests of the Scientific Department correspondence and interchange of publications with other Scientific Departments and scientists in India, Ceylon, the Straits Settlements, the West Indies, the United States of America and elsewhere have been made a special feature of the current work of the office, and the response from the gentlemen approached has been very encouraging. In this connection *The Planters' Chronicle* has proved useful, while it has derived simultaneously additional value for the planting community of South India.

The U. P. A. S. I. has also been called upon to supply information to some of the scientists under reference, and has been able to render a certain amount of help.

Legislative Council of Fort St. George.—Following upon the consideration, at the last meeting, of the method of procedure to be adopted by the U. P. A. S. I. in the election of a representative of planting interests to a seat on the Legislative Council of Fort St. George, correspondence with the Special Officer deputed by Government to frame rules in respect to such elections brought about a satisfactory understanding, and suitable rules were issued in due course.

As a result of the election organized by the Association the Hon'ble Mr. J. G. Hamilton was appointed to a seat in the Legislative Council of Fort St. George; and evidence of his active endeavours to advance the interests of the community he represents have been plentiful during the year under review.

The Scientific Officer.—It will be remembered that the Director of Agriculture, Madras, attended last year's meeting for the special purpose of arranging details concerning the relationship of the Scientific Officer appointed to assist the planting industries to the U. P. A. S. I. As a result of Mr. Couchman's representations, a thoroughly satisfactory agreement was arrived at during the year. Later, a question cropped up regarding the sum to be budgeted for the travelling allowance of the Scientific Officer, for which sufficient provision has not yet been made. Mr. Couchman has been good enough to promise to attend the present meeting so that this subject may be discussed with him.

The Board of Revenue raised a question whether the Scientific Officer's "Contingencies" should not be paid by the U. P. A. S. I., rather than the Government of Madras; but a representation from this Association caused the Government to decide to enter these charges in their own budget estimates.

A brief statement will suffice to explain what has been done in regard to the principal Resolutions adopted at the last Annual Meeting.

Liquor Shops in the Vicinity of Estates.—The representations made to the Governments concerned must be said to have been efficacious, if the almost complete absence of complaints from the planting districts affords any guide to the course of events. It should be noted that as far back as February 19, 1908, the Chief Commissioner of Coorg passed orders that all new sites for liquor shops in that province should be previously notified with a view to ascertaining any local objection to their position and that in the case of shops near coffee estates the planters concerned should be consulted.

Proposed Pest Act.—Delegates this year may be able to state the views taken by their respective Associations concerning the need for a Pest Act.

Pepper Vine Disease.—Government kindly deputed Mr. McRae, Officiating Imperial Mycologist, to visit the Wynaad for the purpose of studying the disease. The Scientific Officer to the U. P. A. S. I. accompanied Mr. McRae, and a preliminary report was published, in which a scheme of local experiments was suggested.

Telegrams.—Combined with the representations of various Chambers of Commerce, Trades Associations and other bodies, the protest entered by the U. P. A. S. I. has doubtless helped to bring about a more satisfactory condition of affairs than that which was commented upon in August last.

Proposed Coffee Cess.—Backed by the Planting Member's personal conversations with officials, last year's resolution on this subject has brought about a change of attitude on the part of some of those who were at first hostile to the proposed Cess scheme. It is understood that the Madras Government are willing to bring the matter again before the Government of India, with an expression of opinion favourable to the proposition, if a sufficiently clear case can be made out showing that the great bulk of coffee planters desire that a Cess shall be imposed.

The work of ascertaining the views of members of District Planters' Associations, of other European planters, and of Indian producers has been difficult and tedious. To obtain lists of names of purchasers in certain districts was the work of many months, and from some districts complete lists cannot, apparently, be expected. The Indian planters of South Mysore have, through their Association, voted in favour of the Cess; more than half of the principal Indian coffee-growers of North Mysore approached have voted dead against it. During the next few weeks, an endeavour will be made to carry out arrangements that will make it possible to gauge the balance of opinion approximately, and then to lay before the Government the statement that they have so long awaited.

Feeder Roads on the Shevaroyis.—Representations under this head have proved of no avail, the Madras Government appearing to think that they have done all that planters on the Shevaroyis can reasonably expect for the present. Government decline, at any rate, to spend any more money on such roads just now.

Roads and Communications.—The latest information about the Theni Bridge is that estimates have been definitely sanctioned at last, and that work will be begun this year. About the question of repairing or renewing the Calicut Pier the Association has received no information from the P.W.D. Secretariat. The Renard Road Train project for Mysore and Coorg has fallen through, the Madras and Southern Mahratta Railway Company having declined to take it up. As regards the proposed Arsikere-Mangalore line the Government of India "while recognising the importance of providing a link between Mysore and the West Coast, regret that owing to the prior claims of more important projects both in the Madras Presidency and other parts of India, they are unable to find a place for it in the Railway Construction Programme in the near future." This programme, Government explain, "includes all Railway projects involving either direct expenditure or any financial liability to Indian revenues, and it has so many claims on it of a stronger nature than those of the Arsikere-Mangalore line that there is no prospect of the latter line finding a place in the programme for many years to come. Should however any private Company come forward with proposals to finance the construction of the line on Branch line terms not involving a firm guarantee, the Government of India will be prepared to give their proposals sympathetic consideration."

Government Purchases of Cinchona.—Negotiations with Government anent the fixing of a minimum price of one anna per unit in the purchase by them of Cinchona Bark in India have been pushed forward to a certain point. Following upon a point-blank refusal to agree to such a scheme, Government asked for statistics of Cinchona cultivation in the various districts, and some of these have yet to be furnished by the Associations concerned. The Planting Member, who has taken a keen, practical interest in the matter, stated the position very clearly in a letter that was published in *The Planters' Chronicle* of April 23, 1910.

Coffee Curing and Freight.—Replies to representations on this subject have been made known through the medium of the same publication. They showed that only one firm of curers was prepared to meet planters in respect to a reduction of curing charges.

Labour Matters.—These will doubtless receive fresh consideration this year, the Council not having been placed in a position to take action in accordance with the conditions resolved upon last August. The interest of planters has been stimulated, and inquiries made by Government point to a desire to trace the defects of present legislation on this subject and to provide remedies for proved disabilities or grievances.

Mr. Brock's scheme in regard to the registration of labourers has elicited much deserved praise of that gentleman's exhaustive and painstaking study of the subject and the thorough manner in which his plans were elaborated; but the general opinion may perhaps be expressed in the assertion that the scheme is too complicated for adoption.

The resolution of the Association regarding failure on the part of process-servers and the police to serve warrants and summonses, elicited from Government a request for a list of cases in which warrants, &c., had not been duly executed. Instances of such failure were furnished, and Government then stated that "under the rules in force the work of the Police in connection with the service of processes is carefully supervised; and that if in any district the Police are thought to neglect their duty in this respect complaints to the District Magistrate will without doubt receive due attention." Government did not consider that the facts laid before them warranted the adoption of special measures in this matter.

Act XIII of 1859.—In June last, the Government of Madras requested to be informed whether any difficulties have arisen in connection with the operation of the Workmen's Breach of Contract Act, (XIII of 1859) owing to offenders absconding to Native States, and, if so, whether in the opinion of the United Planters' Association any special measures are desirable to provide for their arrest in such cases.

Inquiries have been instituted, and a reply will be sent shortly. Naturally, however, planters who are working under Act I of 1903, and not under Act XIII of 1859, have expressed a desire that attention be called also to the difficulties which they have to face in the matter of the absconding of labourers to Native States.

Ceylon and Indian Import Duties on Tea.—The Government of India regret their inability to entertain the suggestion of the Association that the duty on all tea imported into India should be raised to four annas a pound. In the opinion of Government, "the imposition of a protective import duty on tea would be opposed to the principles on which the Indian tariff is based."

Thefts of Tea.—The Madras Government have not seen their way to legislate at present for the prevention of the sale of Tea by employees on estates other than those authorised to sell the article.

The Anti-Tea-Duty League.—Shortly after the 1909 meeting a letter was received from the Secretary of this League, in which he stated that the retention of the Tea Duty at 5d. was practically a foregone conclusion for the year. Funds were still required, however, so that the League might continue to get the whole subject of the Tea Duty "thoroughly ventilated so that public opinion may be concentrated upon the injustice of the tax."

Publications.—Early in 1910 *The Planters' Chronicle* was changed from a monthly to a weekly publication, and, thanks mainly to the energetic way in which the Scientific Officer has contributed to its columns, the paper has gained greatly enhanced popularity among an increasing number of readers. Its scope of utility has been widened, and will be extended further as circumstances permit.

The Book of Proceedings has also sold more freely of late than in former year.

Accounts.—The Auditors to the Association having given up business, the accounts now laid before you have, with the sanction of the Chairman, been audited by Mr. W. H. Haldwell, of the Bangalore Bank, Ltd., a gentleman whose ability and conscientiousness as an accountant and auditor are well known to many people in Bangalore. The meeting will be asked to confirm this arrangement. It will be seen that the figures are much larger than at any time in the past history of the Association, this, of course, being consequent upon the development of the work of the Scientific Department, the opening of a well organized office, and the starting of the S. I. Planters' Benevolent Fund. As regards the General Fund, the "actuals" for 1909-10 compare with "estimates" as follows :—

	Estimate.		Actual.
Income	... Rs.8,118 15 8	...	Rs.8,722 1 4.
Expenditure	... „ 7,100 0 0	...	„ 6,643 1 10.

The actual income, however, includes a second dividend from the insolvent estate of Messrs. Arbuthnot & Co., Madras, for which no definite entry was made in the Estimates for the year. Of the Rs.1,000 grant from the Government of Madras (for the Scientific Officer's Office and establishment) only Rs.750 was received last year, owing to the office not having been opened until September 1909. This was partly counterbalanced by an increase of Rs.125 in the amount of subscriptions collected. After transfer to the Reserve Fund of the second dividend referred to above (Rs.712) together with Rs.288 taken from the General Fund to make up a round Rs.1,000, the actual balance at the close of the year stood at Rs.1,078-15-6, against a balance shown in the Estimates of Rs.1,018-15-8. Of the former sum Rs.409-14-0 was temporarily lent to the Scientific Officer's Fund in order to make up the quarterly contribution of Rs.750 payable to the Government of Madras before June 30, 1910, so that the balance shown in the accounts is only Rs.669-1-6. Subsequent collections under the Scientific Officer Fund have permitted of an adjustment of the loan. The Balance-sheet shows a credit balance of Rs.3,847-11-10, against Rs.2,875-6-4 at the close of the year 1908-09.

The question of the desirability of providing the Scientific Officer with a small laboratory, adjoining his present office, has come up for consideration. Estimates have been circulated, though not in detail. They show the following figures :—

First cost	...	Rs.2,500
Annual upkeep	...	Rs.1,000,

and any details required will be furnished by Mr. Anstead.

In view of this now demand upon the resources of the Association, it is perhaps well to state here :—

(a.) That the Reserve Fund amounts to Rs.2,000, of which Rs.1,000 is on fixed deposit and Rs.1,000 is in current account with bankers.

(b.) That rough estimates indicate that the normal income will only just about cover the normal expenditure, without this extra Rs.1,000 per year required for the upkeep of a laboratory.

S. I. Planters' Benovolent Fund.—This may be said to have been established only tentatively last year, as the approval and actual support of most of the District Planters' Associations had yet to be obtained. As time passed unanimity of opinion was manifested, and at the close of the Association's financial year (June 30, 1910) the fund stood at Rs.2,247-7-0, subscriptions and donations having totalled Rs.2,269, and expenses (for printing) Rs.21-9-0.

It may be stated that by the 20th July the amount of gross collections had been raised to Rs.3,644, and by the 31st idem to Rs.4,469.

Authority is now required for the opening of a special banking account and a separate set of books for this Fund.

Mention may be made here of the fact that Mr. Abbott, Proprietor of the *Indian Planters' Gazette*, made an appeal to the planting community of Southern India on behalf of the widow and children of a deceased planter Mr. Vipand. The response was prompt, and various donations received were remitted to Mr. Abbott and duly acknowledged in the columns of the *I. P. G.* They were not passed through the Association's books.

Your Secretary has only to add that he places his resignation at your disposal.

Accounts.

Passing of the statement of accounts was deferred until a later stage of the proceedings, so that the accounts might be taken up when the subject of Finance was discussed.

Chairman's Opening Address.

The Chairman then addressed the meeting in the following terms :—

Gentlemen,—I do not intend to take up your time with a long address, but it has been the custom in the past for the Chairman to touch on the state and prospects of the various branches of our Industry, which I will do as briefly and concisely as possible.

I should like first of all to congratulate the Association on having had the benefit of Mr. Hamilton's services as Planting Member on the Madras Legislative Council, and I personally wish to thank him for all the trouble he has taken over U. P. A. S. I. affairs as well as several matters in connection with my own District and particularly the Theni Bridge.

With a view to getting as accurate information as possible, I sent out a circular letter to the Honorary Secretaries of District Associations asking them for acreage, crop and labour figures, and I have to thank them for the way they have met me in their prompt answers on such short notice, and although I know many of the figures are only approximate they have been most useful and given a very fair idea of the prospects of the Coffee, Tea and Rubber Industries for the present season.

Produce Exhibition.—With a view to infusing a little more interest into our Meeting this year, I proposed that samples of our produce might be brought for Exhibition, and I am glad to say it has met with general approval and we have some interesting samples of Coffee, Tea and Rubber, which will be on view during the week at the Association office.

As we cannot spare much time during the Meeting hours, I propose that we fix Wednesday and Thursday morning at 8 o'clock for examining and discussing the various Exhibits at the U.P.A.S.I. of office. Mr. Anstead has also a collection of leguminous plants, specimens of blights, pests, etc., which I am sure will be most interesting and instructive. Mr. Hamilton has also very kindly brought with him a collection, showing the types of leaves of Coffee Hybrids and Manihot Rubber varieties, which will be exhibited at the same time. Those interested in these two subjects should make a point of examining this collection.

Coffee.—I have no figures to go on regarding acreage and crop, and if my remarks on this subject are of the briefest it is because I have no experience of Coffee and know little or nothing about it. Prospects for the current year, I gather, taken all over are fair. Prices though lower than we could wish for are steady but prices for the higher grades show a falling off. I am not of course prepared to say whether the falling off is due to want of demand for these qualities or whether it is due to deterioration in the quality. As producers of high grade coffee it behoves East Indian planters to investigate the matter. The proposed Coffee Cess will come up for discussion during the meeting, and I hope some definite conclusion will be arrived at.

Tea.—From the returns received I find this Association represents roughly about 41,599 acres of Tea.

Tea in South India has perhaps never been in a sounder condition, but this is just the time when we want to be on our guard and lay aside something against a rainy day. During times of prosperity there is always the temptation to increase the area, and we have a very serious rival in the shape of Java, and I can assure you the matter of over-production is by no means to be ignored and no opportunity should be missed to guard against this contingency.

One direction in which we can help ourselves, and one which I would strongly recommend to this Meeting, is the manufacture of Green Teas, for which Southern India is particularly suitable.

Another way in which we may improve the position is to press for the opening of Colombo to Indian Teas free of duty and making it reciprocal.

Both these matters will come before this Meeting, and I trust that when the latter is discussed the action of the Government of India in allowing Ceylon Tobacco free into Travancore will not be passed over. I believe that if the advantage we ask for is made reciprocal, Ceylon will back us up and it would be of mutual value to both.

Rubber.—We have now some 29,546 acres under Rubber in Southern India and some of the early planting is reaching the paying stage, and from the returns and results already realised, there is not the slightest doubt that the Rubber in Southern India has a very bright future.

The estimated crop for the current year from Southern India will be roughly about 179,400 lbs. and the cost of production will compare very favourably with Ceylon and the Straits, but there are one or two great advantages we have over these other countries, and the chief is our labour supply. Now that the tapping stage is reached, I think our labour troubles are diminishing. I am now speaking for Travancore and Cochin, as we find that there is a great deal of better class local labour coming in, which will take up tapping, whereas it would not touch the ordinary weeding or new clearing work which has been such a severe test on our labour supplies during the last few years.

The other matter I would mention, and which I think is a most important one from a financial point of view, is the low and reasonable Capital cost per acre, nearly all our Companies stand in at. It may be that we were not in the position to demand the exorbitant prices that have been put on Rubber elsewhere, but we will certainly reap the benefit of it later on. As far as one can see, present prices are likely to hold for some considerable time yet, but the time will come when things must descend to a more healthy level, and then we are going to have trouble. Over-Capitalised Companies and poor Estates, of which there are no doubt many, will have to go to the wall, the Public who have gone absolutely mad on Rubber without knowing or caring what they are buying so long as it was Rubber shares, are the people who are going to suffer.

I would simply throw this out as a warning to investors to beware of Over-Capitalised Companies and even shares in first class Companies which stand at a high premium. With the present high prices they may be all right, but as I said before, we must look ahead. The Rubber Exhibition at Home next year will come before the Meeting later on, and I hope Southern India will do something towards sending an Exhibit.

We have also some interesting points on cultivation to discuss, and a proposition regarding the use we are going to make of the large and ever increasing quantity of seed which can be collected annually and which is far in excess of what will be wanted for planting purposes.

Cinchona.—The market for this is very low at present, and extensions in this branch are practically at a stand-still.

Pepper.—This particular branch of our Industry has had a considerable amount of attention from our Scientific Officer, and we are very much indebted to Government for sending Mr. McRae down to investigate the Pepper Vine disease, and after all the trouble that has been taken, it is most disappointing to find that absolutely nothing has been done by Planters to carry out the simple experiments recommended.

In the face of the discussion that took place on this subject as far back as 1904, when it was thought necessary to go to the expense of getting an expert out from Home, which it was estimated would probably cost about £1,000, towards which the U.P.A.S.I. were then prepared to contribute Rs.1,000, the excuse now given that Planters are unable to carry out the experiments on account of the expense seems rather a feeble one.

A circular containing some three or four questions was circulated to collect certain information Mr. McRae wanted, to which only 3 replies were received.

Cardamoms.—Prospects here are also fair, but I have no definite figures as to acreage and crop.

I do not require to take up your time by referring to work done during the year, as our Secretary's report which you have already heard has been most explicit, but there are one or two matters which will come before us, which I would like to touch on as briefly as possible.

The first and I think the most important item is a Laboratory for our Scientific Officer, and I fully believe it will have the support it deserves. This matter will be put before you in detail by Mr. Anstead, and I think what he asks for is most reasonable. The premises which have been taken up temporarily, adjoining our new Office, are most suitable in every way, and I need hardly point out that it will be a great advantage to have our own laboratory, and I feel quite certain it will cost no more, and possibly less, than it would have cost us to rent a room in the Mysore Government Laboratory even had it been available.

The Annual Upkeep Mr. Anstead puts down at Rs.1,000 and the initial cost of fitting up the Laboratory at Rs.2,500. During the interval Mr. Pittock has very kindly put the use of his own private Laboratory at Mr. Anstead's disposal, for which I will later ask you to accord him a hearty vote of thanks.

As regards the work of our Scientific Officer, I think you will agree with me that he has had a strenuous year and covered a lot of ground. He has taken a keen interest in all branches of our Industry, and has I know a great deal of useful matter and information to lay before this Meeting.

Now that we have got our Scientific Officer, we want to make all the use we can of him, and it would be very short-sighted policy, after the heavy expenditure we have already gone to in the matter, to grudge the small sum now asked for towards the Laboratory, as without it we cannot get the full value of Mr. Anstead's services. Money spent in this direction will all come back to us, with liberal interest, in the shape of useful information and results, which we cannot otherwise hope to get. I trust delegates have come prepared to find the necessary funds and that the Laboratory will shortly be an accomplished fact.

Planters' Chronicle.—This has now become a weekly paper and I am sure is going to prove a most useful Journal of Reference, but I think very few of us realise the great strain this has thrown on our Secretary. I would urge every planter to order the bound volume in future, as it must be remembered that reference will be continually made to back numbers by Mr. Anstead in reply to various queries, and if these are not available, the utility of the *Chronicle* disappears altogether.

Planters' Benevolent Fund.—This has not been taken up as strongly as I had hoped, though during the last week or two, it has shown some improvement in the way of subscriptions, and I am glad to be able to report the promise of Rs.500 from Mr. Acworth, a former Chairman of this Association and Planting Member, and that a similar amount has been paid in by Mr. James Chisholm through the Coorg Association. I think we have now got enough to enable us to go ahead and push the scheme more than had been done during the past year. There are one or two points in the rules which I think want revision, and we must certainly have an Executive Committee to manage the Fund, as I am afraid the entire Council of the U. P. A. would be too unwieldy and lead to a great deal of delay and unnecessary correspondence.

Theni Bridge.—After years of weary waiting and disappointment, we are again assured that this long looked for Bridge will be started without delay. I predicted once before that it would be built and that we could remove it from our Agenda, but it still remains, though I hope this time it really will be taken in hand. The correspondence will come before the Meeting in due course, and if it is considered satisfactory, there will be no necessity for the deputation to His Excellency the Governor of Madras which was proposed by the District Associations interested.

Labour Matters.—There will no doubt be some discussion under this heading, though perhaps conditions have been rather easier this year.

Although we cannot object to emigration, I think it wants looking into and something should be done to protect South Indian Planters and Maistries from suffering through their already advanced labour being enticed off to the Straits and elsewhere by unscrupulous Agents who hang round with money to waylay coolies starting for our Estates, often under the cloak of Government help.

Accounts.—The Accounts have been laid on the table and as regards the estimated and actual expenditure, I think our Secretary is to be con-

gratulated on the result, though at the same time I would point out to District Associations that the actual balance carried forward is only Rs.669-1-6 plus Rs.409-14-0 advanced to and since recovered from the Scientific Officer's Fund, making a total of Rs.1,078-15-6 in all.

It has been proposed that we might draw on our Reserve Fund towards the expenses of equipping and starting the Laboratory.

Well, Gentlemen, I don't want to build up a large reserve, but I trust the funds for the Laboratory, amounting to Rs.2,500 as per Mr. Anstead's estimate, will be raised without our having to draw on our Reserve this year. The upkeep for the current year will be very little, as it will take some months to get the necessary instruments out from Home.

Our expenses as regards our Scientific Officer's scheme are bound to increase, if we are to get full value from Mr. Anstead's services, and I think we should keep our reserve untouched for the present, if we can. However, this is a matter which will come up under the heading of Finance.

I am afraid I have taken up a great deal of your time, and in closing would like to refer very briefly to the management of our District Associations. From the returns I have received, I find in some districts large acreages standing out, which is not right and shows great want of combination.

The most common excuse is that the Association is of no use to them and they have never got any good out of it, and another favourite reply is that it is a One Horse Show and is run by the Chairman or the Honorary Secretary.

As to the former we are now in a position to flatly contradict it, as although in the past some Planters may not have derived any direct benefit, now that we have our Scientific Officer and I hope will also shortly have our own Laboratory, two things we have been clamouring for; for years, that excuse can no longer be made. I know there are some Planters who imagine they know everything and fancy they have nothing more to learn, and these we are better without, but there are many others who quite recognise the value of our Scientific branch and the information given in the weekly *Chronicle*, and I hope these will now come in and help to strengthen the Association and add to the funds required to make it a success.

As regards the latter excuse, I would ask Planters to remember that the post of Secretary or Chairman of a District Association is not always a bed of roses, and very often is a thankless job.

If a man is keen, unless he is very tactful he is accused of running the show, and if he is slack nothing is done, then Planters rightly turn round and say the Association is no use. I hope this coming year will see many new members added to District Associations, and we have to welcome to this Meeting a delegate from a new District represented by Cochin and North Travancore Association, just lately formed.

In closing, I wish personally to thank Mr. Ormerod for the great help and assistance he has given me during the year; he has had a very heavy year's work, and the correspondence has increased tremendously, principally due to the Scientific department and the *Chronicle*.

Work of the Planting Member.

The Chairman then called upon the Hon'ble Mr. J. G. Hamilton to give the Conference a short report of his work as Planting Member of Council.

The Hon'ble Mr. Hamilton, who rose amidst cheers, made the following speech:—

I had rather hoped to get off this portion of my duties, as there is nothing to report beyond what has already appeared in the *Chronicle*, or matters

which I knew beforehand must certainly be referred to in the Annual Report. However, as you insist on my justifying my official existence by speaking on this occasion, I obey. The work put into my hands during the past year has not been heavy. It consisted of the Theni bridge, Anamalai leases, Anamalai hospital, cinchona purchases by Government, and the coffee cess, but some of these not depending on one department only, and some of the others being of very long standing, and for other reasons which I shall refer to later, a good deal of persistence was needed. Fortunately, it happened that I had some leisure, and I was able to do a certain amount of worrying, during the whole of which my reception by every one was all that could be desired, though I gave a great deal of trouble. There is no need to mention any names, but you may believe that we are sure of a fair hearing if we have any respectable sort of case, but it must be made certain that it will be respectable before we send it up. One thing I do wish to put to the Association most emphatically, and hope it will be borne in mind very carefully, *viz.*, that in any matter on which there is reason to believe that the Planting Member's information is not absolutely perfect, it is essential for success to get up the case properly and give the fullest information, both as to what you want and as to arguments justifying your demands.

It is worse than useless sending up a bald Resolution demanding something, either through me or through the office. You must not only say why you want anything, but also why you consider that you deserve it, or at any rate, prove that your proposals cost nothing and do not harm. I say worse than useless, because, if a request is refused even if only for want of a good reason being shown for granting it, you have that refusal on record against you, and the matter may never be reopened. During the year there were two matters which gave me a good deal of trouble. In one, a local Association put me on the track of a certain matter direct, and as it did not affect any one else, I took it up without demanding instructions from the Executive. No one could tell me where to go or what to do, and it took two months' intermittent worrying to get through. Even then I never found what I was looking for, but owing to the general trouble created by my search, the wheels started again and the thing went on. Had those two months' leisure not been available, and they will not be generally, there would have been a failure or a big delay, because the spade work had been incompletely done or practically left undone.

In another matter affecting three or more Districts, the Executive of one Association has hustled me most energetically; when I called for certain information, that particular Association supplied it after a time, but the others do not seem able to collect their share from members, so the matter is hung up. Failures like that discredit me in my work and jeopardise your interests. There has always been far too much of indifference on the part of planters. It is quite possible for slackness on the part of a small number to keep back the work of the U. P. A. I can assure you that the Secretary does not call for statistics for his own amusement, and it is not always possible to give full information to every member of all Associations as to why they are desired, but they are needed, and I hope we shall find less and less delay in furnishing them as we go along. The Planting Member, in particular, must be able to answer questions put to him, which are often necessary in an enquiry, and it is impossible for any one planter to know the conditions and needs of every district and product without general help. There are no unofficial communications to make, but as subjects come up on the agenda, I shall be very glad if I can give any information.

At the request of the Chairman the Scientific Officer to the Association, Mr. R. D. Anstead, B. A., then read his report, which is given below :—

Scientific Officer's Report.

14TH MAY, 1909—30TH JUNE, 1910.

MR. CHAIRMAN AND GENTLEMEN,

I have the honour to present to you a Report upon my first year's work as Planting Expert, and Scientific Officer of the U. P. A. S. I.

In this Report I do not propose to say anything about the various insect and fungoid pests to which my attention has been called during the year; with your permission I will deal with these under their separate headings on the Agenda Paper.

OFFICE AND CORRESPONDENCE.

An Office was early in the year established for me in conjunction with the Offices of the U. P. A. S. I. in Bangalore, and the upkeep of this, with my establishment, consisting of a writer and peon, is met by a contribution from the Government of Madras.

Office work during the period under review has increased rapidly, and the amount of correspondence is large, as may be judged from the fact that during this year, 1910, up to the end of June, 217 letters have been dealt with. The majority of these letters have been from planters asking for advice about manuring, cultivation, pests, &c., &c., and have been answered personally. Though this correspondence takes up a large amount of my time, and entails a great deal of work, I welcome it as a sign that I am getting into touch with individual planters, and have been of some little use to them during the year.

THE "PLANTERS' CHRONICLE."

I have contributed regularly to the pages of the Planters' Chronicle, which has from the beginning of this year been made a weekly. For this publication I have written, during the official years, 32 articles, and 50 notes, as well as miscellaneous contributions. I hope to use it in the future, more and more as a medium of communication with planters, and to answer in its pages many of the questions asked in the correspondence, especially when these questions are of general interest. I also hope to use it as a running progress report of the work carried out in the office, and the field.

In my articles I have attempted not only to give advice about points of general interest which have been submitted to me, or which I have noticed, during my tours, required attention, but also to keep planters informed of what is going on at Agricultural Stations, and Departments interested in the same crops in other parts of the world, and of discoveries and advice of well known experts.

The U.P.A. receive by exchange and otherwise a large number of papers and periodicals which the individual planter either has not access to, or has not time to read, and it appeared to me to be plainly my duty to summarise, and comment upon where necessary, such points in these publications as were of interest to the planters of Southern India.

HERBARIUM AND COLLECTIONS.

A beginning has been made with a herbarium of the Leguminous Plants which occur in the different planting districts, with the object of determining which of these can be used as cover crops, and green dressings, and a few of the most promising are already under trial on several estates.

I propose to supply each Planters' Association with a set of herbarium specimens of the plants suitable for green dressings which occur in its own

district in the first place, and later on of those in other districts, so that the members may be able to recognise the plants, which it is difficult to do from Botanical names alone. This work will necessarily take time, but 40 sheets have already been prepared for my office collection, and two small lots of duplicates, comprising 17 sheets, have been sent out, one to the Wynaad Planters' Association, and one to the Coorg Planters' Association.

I shall be glad of help from individual planters in this work, both by the receipt of specimens, and especially of local names of plants, in the different districts. During this meeting I hope to exhibit the collection which has already been made.

A Microscope and collecting apparatus, to be supplied by the Government of Madras, are on order, but have not yet been received. When these arrive I shall be in a position to investigate plant diseases apart from their mere field appearance. I hope to gradually get together a working collection of insects and fungi representing the pests usually met with, for reference at these meetings, and for the use of planters who visit Bangalore from time to time, so that the U. P. A. S. I. may in time become a Bureau of Information about plant diseases and pests.

TOURS.

Since 14th May 1909, the day on which I arrived in Bangalore and assumed charge of my duties, I have attempted to see as many of the planting districts, represented by the U. P. A. S. I., as possible, and I have spent the majority of my time in touring. The following districts have been visited, in the order given:—Anamallais, Nilgiris, Shevaroyes, North Mysore, South Mysore, Wynaad, Coorg, South Travancore, Cochin, Mundakayam, Central Travancore, and the Shevaroyes and Nilgiris for the second time.

These tours have necessitated my travelling something like 4,800 miles by rail, and 1,800 miles by road.

In first passing through the districts my object was to see as many planters as possible, and to get an idea of the general conditions, the difficulties, the pests, and what had and had not been done. All the tours were necessarily made comparatively rapidly, and no detailed work could be done in the time at my disposal. In one instance only, when I visited the Wynaad, and in conjunction with Mr. McRae, then Assistant Mycologist at Pusa, to investigate the Pepper Vine disease, was any detailed work undertaken. The study of diseases may necessitate a lengthy stay in, and repeated visits to, the affected districts.

During some of the tours I was able to attend meetings of the Planters' Associations, and special meetings arranged for me, and on these occasions I delivered lectures, twelve in all.

One of the things which has struck me most as a result of my journeys, is the wide way in which the various districts differ in respect to soil and climate, and the way in which each district seems to have its own particular disease.

While in one district Coffee shade may be light, in another it must be dense on account of the prevalence of Borer; while in one district Tea prunings must be burned as soon as cut on account of Mosquito Blight, in another this pest is unknown, and the prunings may be buried at leisure; while in one district Pará is the best Rubber to grow, in another it is waste of time trying to grow it, while Ceará flourishes; while in one district *Crotalaria Striata* is an excellent cover crop, in another it will not grow at all, and in yet another it grows too big. The result is that what is good planting policy in one district, is the reverse in another, and no general

advice can be given, and no hard and fast rules laid down: each district must be considered in relation to its own particular problems and conditions, and each could find more than enough work to keep a Scientific Officer fully occupied during the year.

MANURING AND EXPERIMENT PLOTS.

The question of manuring has for some time past been an important one for Coffee planters, and it is rapidly becoming important for Tea planters, both to increase the yield and to combat disease. The time will come when Rubber planters will also have to turn their attention to manuring, and the relation of fertilisers to latex yield is a problem which needs working out.

Manuring should be more systematic than it often is at present. It appears to me that manures are too often applied in a haphazard way, fertilisers applied in any one year having little relation to those applied during previous years. A manurial scheme for the estate should be drawn up, covering a period of years, and be carefully carried out, and in this scheme Lime should find a place more frequently than it does at present.

Whether manuring has any direct effect upon the quality of Coffee and Tea is an open question, which only systematic manuring can answer.

The basis of any manurial scheme should be a soil analysis which shows among other things the amount of plant food, Potash, Phosphoric Acid, and Nitrogen, in an available form. Though such an analysis cannot tell us exactly the best manure to apply for any crop, it indicates clearly the general lines which should be followed. Thus a soil analysis, for example, at once shows whether lime is needed to ensure the best results from the application of mineral fertilisers, and whether basic, or acid, fertilisers should be used.

The only way in which the best manurial treatment for any given soil, and crop, can be determined is by direct experiments, and such experiments are not conducted, at present, in a sufficiently systematic way.

In the absence of Experiment Stations, experimental work must be carried out on the estates themselves, and it is unpopular for several reasons.

In the first place the results of field experiments are very difficult to interpret. The growth of plants is influenced by so many factors: temperature, water supply, food supply, and in the case of Coffee especially, the seasonal factor has a tremendous influence. Small variations in any of these conditions may lead to very marked differences in results. The soil is a very complex mineral mixture, with very varying mechanical properties, and also a teeming microscopical flora and fauna which is yearly being discovered to be of the utmost importance to the crop.

These difficulties may be overcome to a great extent by making the experiments as simple as possible, and designing them as far as possible to answer one question at a time. Complicated manurial experiments, with quantities of fertilisers which are in any case unpractical, have been shown to be failures in the past, and have no doubt tended to make this work on the estates unpopular. Experiments designed, however, to test the benefits of cover crops as compared with a system of clean weeding; the application of mineral fertilisers before or after the monsoon; the possible advantage of Basic Superphosphate over ordinary Superphosphate on Southern Indian soils; the advantages and disadvantages of forking Coffee, and of burying Tea prunings; the best time to tap Rubber, the best system and knife to use; these and many similar experiments could be, and should be, worked out in a systematic way.

In the second place field experiments on estates are difficult to carry out because to ensure a correct answer to any question asked of the soil being obtained, each experiment must extend over a number of years, and be accurately conducted. Here there is a difficulty of labour, and time required for superintendence. Managers and owners go home periodically, and the estate during their absence is looked after by a writer, or a neighbour, and experiments are apt to be abandoned.

This is a difficulty not so easily overcome, but I would suggest that in each district definite experiments should be begun in definite places, and controlled by the planting community of the district. It often happens that I am offered a field on an estate, to try experiments, and I feel sure that such offers would be made to the District Planters' Associations.

Neither time nor your patience will allow me to discuss a scheme in this report, but I hope that it will be considered at this meeting, and I would suggest that a committee be appointed to elaborate some detailed practical scheme to lay before the various Planters' Associations. Better results would be secured from experiments conducted at definite places, where their continuity could be assured, than are at present obtained from numerous little experiments which are being conducted, many of them at my suggestion, on estates here, there, and everywhere; experiments which are constantly breaking down because some individual planter, though his spirit is willing enough, has too much other work to do to look after them.

AGRICULTURE AT ANNUAL MEETINGS.

I would respectfully suggest that this Annual Meeting of the U. P. A. should devote more time to the discussion of actual Agricultural Problems. There are many important questions discussed from time to time in a desultory way through the medium of the Press. I need only mention Green Dressings *versus* Clean Weeding, and the Bug in the Nilgiris, on both of which subjects many letters have appeared during the past twelve months.

If one or two subjects like this were taken up each year, and papers read at this meeting by planters, they could be thrashed out in a much more satisfactory way than they are in the correspondence columns of a newspaper. I think that this is of particular importance to Rubber planters, for at present comparatively little is known about Rubber cultivation anywhere, and it cannot be too freely discussed. A Conference such as that held a little while ago in the Straits is of immense value, and brings together a lot of information gleaned from personal experience in the field. Too much should not be left to officials. This is a *Planters'* Association, and I should like to see planters taking a very active part at the annual meeting in agricultural discussions.

In conclusion I beg to tender my thanks to the planters for their courtesy in electing me an honorary member of their respective Associations and to the Secretaries of these Associations, and the numerous individuals from whom I have received such bountiful welcome, and hospitality during my tours; and I should also like to record my grateful appreciation of the kindly assistance which I have received during the year from the Secretary of the United Association.

The King Edward Memorial.

The Hon'ble Mr. HAMILTON said:—Sir,—You have already at the opening of this Meeting given expression to our feelings to show our sense of the loss that our Empire has sustained by the death of King Edward; and it now falls to me to ask you if possible to give me instructions as regards the action to be taken towards perpetuating his memory. As you know, I have been made a member, and some other planters also, I understand, have been

made members of the Madras Committee. Since my arrival in Bangalore I have been further honoured by an invitation to join the All-India Memorial Committee. There can be no doubt that these Memorials are to the memory of one who should never be forgotten, and that our community is not one which would like to stand aloof while there are movements all over India to do honour to his name. Personally I have no doubt, with the record of his life still fresh in our memory, that we must feel that no more fitting Memorial, and none which would be more likely to appeal to his heart were he still with us, could be devised than the one of taking some steps to alleviate suffering, whether of man or beast. The Executive Committee of the Madras General Committee has determined to recommend a Hospital for Consumptives; and I think that any institution of this kind must commend itself to us. What shape the All-India Memorial will take I have no idea. I do not believe that any proposal has been put forward—at any rate, I have not seen any in the papers. [Mr. Abbott called attention to the fact that this Memorial is to take the form of an equestrian statue to be erected at Delhi.—ED.] But I hope that the community will soon let me know whether it is your wish that we should join both or only one. It is quite possible that the delegates to-day will not like to give a definite decision. They may prefer to consult those whom they represent here. It is not my intention, therefore, to move any definite Resolution on the subject now. Indeed, if any formal Resolution should be proposed it will be more fitting that you, Sir, should put it before us. All that I propose now is that we go into Committee to discuss the question in detail.

After a few minutes discussion in Committee, the following Resolution was adopted by the Conference in open Meeting, on the motion of Mr. J. J. Murphy seconded by Mr. W. H. G. Leahy:—"That the matter of subscription to the King Edward Memorial be referred without delay to the District Planters' Associations."

SECOND DAY—AUGUST 2, 1910.

[It is not proposed to report the proceedings here in detail, but simply to make reference to some of the principal subjects discussed and speeches delivered, as a full report will appear later in the annual Book of Proceedings.]

Laboratory for the Scientific Officer.

After full consideration, the meeting adopted the following resolution, proposed by Mr. R. D. Tipping and seconded by Mr. C. K. Pittock:—

"That this Association approves of and confirms the action of the Secretary in securing the necessary accommodation adjoining his office for the Scientific Officer's laboratory, and, in accordance with the Scientific Officer's estimate, a sum of Rs.2,500 be raised amongst the District Associations and individual planters for equipping the laboratory; the manner in which the necessary funds are to be collected, to be decided at this Meeting. That in view of the urgency for providing the necessary appliances with as little delay as possible, a sufficient sum be allotted from the U. P. A. Reserve Fund, which shall be repaid when the donations are realised."

The financial aspect of this matter was discussed in Committee, and the Chairman was able to announce that the sum required for the cost of equipping the Secretary (Rs.2,500) had been subscribed, as well as a good part of the money for annual upkeep (Rs.1,000 a year).

Delegates promised to urge upon their respective Associations the necessity for contributing more liberally than they had yet undertaken to do to this upkeep.

Hybridisation of Coffee,

On this subject the Hon'ble Mr. J. G. Hamilton spoke as follows :—

As the only planter present who has done any continuous work in connection with hybrid coffee, and as one who has for some time past been very sanguine as to the possibilities of getting an improved strain through them, I have been asked to give a history of our trees. This will not amount to much, as it is only within the last six years that any systematic efforts have been made at developing a permanent variety.

About 15 years ago, perhaps more, I was given a few seeds of a well-known local hybrid strain—seeds of the second or third generation, I am not sure which. These proved so unsatisfactory that I did not persevere, but before finally abandoning them I had bought some seeds from Wynaad, from whom I cannot remember, and found that while among them there were all sorts and conditions, some appeared promising. For some years I just left these to grow, and about six years ago I commenced to cut out all obviously unsuitable trees and to plant a few trees from those which pleased me most. Even these did not all turn out well, but I have about a dozen trees of the fourth generation under observation (5 years old) of which some 6 or 8 may be regarded as satisfactory—extremely so as far as one can judge at present. Of course, I have also a number of younger ones coming on. They ought not to be planted less than 8 ft. by 8 ft. I have them 10 ft. apart along a road. They have a distinctly mixed appearance, make a great spread, and bear long, strong but not profused wood. On the whole I consider them to have more Liberian characteristics than necessary in Mysore, so I have made no attempts to protect them from cross-fertilisation with the surrounding Arabian coffee. In fact I have hoped to get it and think it must have taken place, as the plants of the fifth generation which have been raised from the seed of these trees have a distinctly Arabian appearance. Should bug arrive in Mysore it would be advisable to protect the trees of the fourth generation from possible crossing in order to fix the type as it exists now as far as possible.

From my present point of view I have only aimed at a light strengthening of the trees by the introduction of the hardier Liberian strain. It had been obvious all along that the few trees which were attacked at all by leaf disease shook it off very soon, and I also discovered last year that the coffee, though naturally not quite as clean as our ordinary Arabian, was worth 50s. to 55s. at Home, so it looked as though a further dilution of the Liberian, that is to say a dilution with Arabian blood, would bring the quality up to ordinary East Indian standard. The coffee valued was of the third generation; that of the fourth generation is so valuable as seed that I shall not be able to spare any for market samples for some time to come, but it seems quite evident that a tree which gives increased crops as these do and improved stamina is very valuable, even if its produce is worth 5s. or even 10s. per cent. less than the poorer crop of its weaker neighbours.

Work so far has been quite rough and ready, consisting merely of selecting suitable trees as seed bearers and destroying all condemned as unfit. But now we are trying, with Mr. Anstead's help, to make more scientific experiments. This year the attempt is almost a failure, but as time goes on we hope to learn more of the best methods to suit coffee and to carry on careful and systematic breeding. I have 17 or 18 varieties of coffee growing, including different hybrids, and a large acreage of jungle, so the only obstacles are the expense and trouble, which are great, and the proper advice, which at present we have.

I do not stand here to be shot at as an authority on the subject, but if you can get any information out of me by questions it will be a pleasure to me to help you.

The matter is well worth the attention of all coffee planters. It is evident that we must do something to add to the resisting power of our coffee. I believe this is a fair chance and am going on with the strain myself. Time is my great trouble but, being convinced of the possibilities latent in this more or less accidental commencement, I will give all I can spare to it and push on as far as possible.

Mr. C. DANVERS next addressed the meeting on the same subject as follows :—

My Association feels very strongly that a new strain of coffee is required, whether a hybrid or a natural one. There is no doubt that the quality of our coffee is deteriorating, so also the vitality of our trees as a whole. Pests and diseases are increasing, and as years go by the coffee plant will be less and less able to withstand them. Unless coffee growing is to pass from the East entirely to the West, some more vigorous and heavily-yielding variety must be found. Hybridisation should be continued, and may turn out to be our salvation; but it is a long and weary process, and while the grass is growing the horse may starve. "Robusta" coffee seems to promise well, and some of us are procuring seed—which I may remark is not being given away. Mr. Lampard, Chairman of the Rubber Plantations Trust, Ltd., spoke of varieties discovered by them in the Congo Forests which yielded even 20 cwts. an acre. These returns were in the experimental stage and awaited confirmation by further experience. Now experimental cultivation is apt to be misleading and disappointing. We have all seen *C. Arabica* trees bearing at the rate of 20 cwts. an acre—and a great deal more—but the results over large acreages generally average 3 to 4 cwts. "Liberian" was boomed as a heavy yielder and immune to leaf disease; it was poor coffee, and while it certainly resisted leaf disease for a number of years it eventually succumbed, and I have never seen such awful *Hemileia* on any variety as I have on Liberian, trees having been killed out by it in one season. "Maragogipe" was tried, as being a fancy bean of great size and excellence. So it is, I believe, if you can find it among the foliage. I am not therefore too sanguine as to the possible results from new varieties, or hybrids; but if we can improve our quality: or appreciably increase our quantity, and that on a healthier and hardier tree than we now possess, we may face the gloomy possibilities of the future with more cheerfulness.

My Association therefore urges very strongly that both the U. P. A. S. I. and the Scientific Officer should take up this matter very seriously and earnestly. Our sticky young brothers of the rubber belt are booming; we old Pioneers of planting are getting stiff in the joints; and without wishing their interests neglected, we would ask that our old age complaints be given earnest attention. We do not seem to possess many alternatives to coffee, so must endeavour to improve our strain. We therefore urge on the Scientific Officer the pressing necessity of new strains, natural or producible.

We also suggest that the present deteriorated state of the coffee bean be enquired into. There being no laboratory now available, the services of a good London Chemist might be utilised to examine beans, determine what constitutes a good sample, and, if possible, what causes the presence or absence of the essential oil which seems to govern liquoring. We were very reluctant to accept the dictum of Mincing Lane when it first raised the cry of "deteriorated Mysore," but I think most of us now acknowledge the truth of the cry. Much of our coffee when pressed or heated loses its oil, and I have seen coffee in the West Indies also pale off when passed through a Snouts polisher; but half an hour afterwards the oil had rolled up to the surface again from the stores within. Those of us who keep coffee

for personal use often notice how the colour is lost in a few months, and end by drinking something very like old putty to look at, and tasting of nothing in particular. Something is very wrong somewhere, and we would press for the solving of this problem. Even now good coffee is occasionally grown, but whether it is due to successful fructification, to climatic causes, to the use or non-use of artificial fertilisers, or to what, we do not know, and hazard many wild conjectures. Dr. Lehmann admitted that he had learnt nothing as to what caused "quality." We hope a determined effort may be made, and at once, to find out something about it and meanwhile to introduce a new, hardy and more prolific strain of coffee.

Perhaps some planters may disagree with what I have said about the rapid loss of colour in coffee kept for use—but I can assure them that I keep samples from several estates, and while it may be one sample which deteriorates one year, another season may see another sample go off, while the former has improved in quality and keeping power. Good or poor fructification seems to have much to do with this variation, but I used not to notice it formerly.

At the conclusion of his speech Mr. Danvers moved the following Resolution:—"That in view of the decreasing yield, poor quality and increased liability to diseases of our present strain of coffee, the U. P. A. S. I. and the Scientific Officer be asked to persevere with the experiments in hybridisation steadfastly; that an endeavour be made to ascertain by searching inquiries the quality, bearing capabilities, freedom from diseases and general suitability of some of the new varieties with a view to the procuring of seed for distribution on payment to the various Associations, and that a good London Chemist be employed to determine as far as possible what constitutes a good sample, to inquire into the important question of the essential oil of coffee and to generally advise us on the whole question of deteriorated quality."

Mr. H. G. Parsons seconded the motion, and said that he would be only too pleased to place his hybrids at the disposal of Mr. Tipping, if he would arrange for a small Committee of planters to carry out experiments.

Mr. R. D. Tipping thanked Mr. Parsons for the offer, but said that he had not thought over the matter as to what form the experiment should take. He had no doubt, however, that under Mr. Anstead's guidance they would not find any difficulty in regard to any experiments they might undertake.

After discussion in committee the above resolution was adopted unanimously, the words "that a good London Chemist be employed" being, however, deleted and the words "that the Scientific Officer be asked" Substituted.

THIRD DAY—AUGUST 3, 1910.

Among the visitors were the Hon'ble Mr. Stuart Fraser, British Resident in Mysore and Chief Commissioner of Coorg; Major Grey, First Assistant Resident; Mr. M. E. Couchman, Director of Agriculture, Madras; Dr. Morris Travers, Director of the Indian Institute of Science, Bangalore; and Mr. G. H. Krumbiegel, Superintendent of Government Gardens and Economic Botanist in Mysore.

Rubber,

The Scientific Officer addressed the meeting in the following terms:—

The most interesting problems to be solved in the future of Rubber planting are those in connection with improved methods of coagulating the latex and curing the rubber, and those bearing upon the possible relation of

fertilisers to latex yield. The former are problems which must be solved in the laboratory, the latter in the field.

It has been stated that Nitrate of Soda, applied at the rate of $\frac{1}{4}$ to $\frac{1}{2}$ -lb. per tree, a few weeks before tapping is begun, increases the yield of latex in Ceará, and I have already arranged some field experiments on a small scale to test this point. It is too early in the season for any results to be available, but they will be laid before you, through the medium of the *Planters' Chronicle*, as soon as they are obtained.

Another point of interest is the possibility of obtaining a hybrid by crossing Ceará rubber with one of the new *Manihot* varieties which will be better than either. It would seem that there should be little difficulty in obtaining such a hybrid since all of these varieties are species of the same Genus, *Manihot*. I hope to be able to devote some time to this work and shall be glad of your co-operation in it.

There is a question with regard to the future of the Pará industry to which I wish to call your attention. A large number of the Pará trees planted in Southern India are already beginning to bear seed, and each year more and more will do so. The time will very rapidly come, when the demand for this seed for planting purposes will fall far below the supply, and the question will then arise as to what use can be made of it. It has been estimated that each tree after attaining its fifth year of age produces a crop of 500 seeds annually, and that about 200,000 seeds go to a ton. If this estimate is only approximately correct the crop of seed from Southern Indian estates will be very large.

In a Report made by the Director of the Imperial Institute in 1905 it was stated, that the seed contains some 20% of an oil, which was then valued at Rs.300 per ton. The seed also contains 1.07% of Phosphoric Acid, but its Nitrogen content is not stated.

Now what I suggest to you is this; that the seed should be collected, and crushed, the oil extracted, and the residue used as a poonac to manure the trees. This poonac should be a very suitable fertiliser for Rubber, since its constituents have been gathered from the soil and air by the plant itself.

Further analyses, which I shall hope to make, will show its exact value as a fertiliser, and if the value of the oil can be made to pay for the extraction and crushing, estates will obviously benefit by the process.

My object in calling your attention to this possibility at this time is, that in planning factories it may be taken into account, and provision be made in the horse power of the engines laid down for the future addition of crushing machinery.

Probably the most economical method of handling the seed would be to establish central factories on a co-operative plan, which would deal with the seed of a district, crediting each supplier with so much oil and returning to him so much poonac for each ton of seed delivered, an amount which could be controlled by a simple analysis of each sample, which a writer could be easily taught how to do by rule of thumb. This is a matter, however, for your consideration.

I would suggest that the advice of a skilled engineer be obtained as soon as possible, to recommend the best machinery for the purpose of crushing or stamping the seed, and extracting the oil.

It seems to me that the sooner preparations are made to deal with the seed, which will soon be available in large quantities, the more likely we are not to lose time and a valuable source of manure for the Rubber.

Fertilisers.**NITROLIM.**

In regard to this subject the Scientific Officer said :—

Until comparatively recently the only mineral nitrogenous fertilisers were salts like Saltpetre, Nitrate of Soda, and Sulphate of Ammonia. Lately, however, it has been discovered how to make the free Nitrogen of the air combine with the metals to form Cyanamides, which are related to Nitrates, and one such body, Calcium Cyanamide, under the commercial name of 'Nitrolim,' is now on the market as a fertiliser. Trials made with it in England at Rothamsted, and elsewhere have shown it to be about equal in value to Nitrate of Soda, and Sulphate of Ammonia.

I think that in all probability it will prove to be an excellent fertiliser for South Indian Soils, because it is of a basic nature. In the soil, under the influence of water and bacteria, it splits up and undergoes changes, the final products being Calcium Carbonate and Nitrates. The soils with which we have to deal are nearly always deficient in Lime, and consequently a fertiliser, which not only supplies Nitrogen, but at the same time, Lime should be of more value than one like Sulphate of Ammonia, which needs, the presence of Lime to be fully effective.

I have been in communication, during the past year, with several firms about this, with the result that Messrs. Peirce, Leslie & Co. have been appointed agents for this fertiliser, and are now prepared to supply it. By their kindness, I am able to show you a sample of the stuff to-day. You will notice that it is a heavy, dark-coloured, powder very finely ground. It is guaranteed to contain 18% of Nitrogen, and 24 to 30% of Lime, and it can be mixed with Basic Slag, Bone Meal, Superphosphate, and Potash Salts. During this mixing, it may get hot, in which case the heap is watered, a plan which is probably advisable in any case, as the Nitrolim is very fine and dusty.

The price I understand to be Rs.230 per ton, at Calicut.

I should like to see some definitely organised experimental trials carried out with this fertiliser, on Coffee and Tea especially. It may be that it will not prove to be any better than the Nitrates usually used, but I think that from its basic nature it is very likely that it will turn out to be just the right sort of fertiliser for Coffee Soils.

The experiments which I suggest should be tried with it are as follows :

1. Nitrolim, applied by itself in February or March, at the rate of 2 cwt. per acre, broadcasted and lightly worked into the top soil.

Cost Rs.23 per acre (exclusive of freight and application).

2. A complete fertiliser made of the following mixture :—

- 5 Basic Slag.
- 3 Sulphate of Potash.
- 4 Nitrolim.

This mixture will contain about 7.5% of available Phosphoric Acid, 11% of Potash, and 6% of Nitrogen. It should be applied in February or March at the rate of 6 cwt. per acre.

Cost about Rs.46 per acre (exclusive of freight and application).

Variations of these two standard experiments can be tried, and I hope will be tried; for instance the quantities applied and the seasons of application can be varied, and in the mixture recommended, Superphosphate can be used instead of Basic Slag.

[*Since the above paper was written, information has been received from Messrs. Peirce, Leslie & Co., that the price of Nitrolim has been reduced to Rs.200 per ton at Calicut. This revised price brings the cost of the fertilisers used in the experiments suggested to about Rs.20 and Rs.42-8-0, respectively.—R.D.A.]

Pests and Diseases.**GREEN SCALE.**

Mr. W. C. Deane said :—

So much has been advanced in print latterly on the subject of combating the bug, that there is little room to add to the repressive measures now recognised as effective for keeping the pest under control. Hailing, however, from that part of a district where it has left its mark very wide, I have some notes which may be useful. The point of vital importance is, of course, to take to these repressive measures on the first appearance of the bug, and it is satisfactory to know that on the Shevaroy's, for instance, so long immune from the ravages of green scale but where it is now in evidence, a general and determined stand is being made to keep it from spreading. On the Nilgiris we had bug of all sorts for years which no one seemed to mind, and when the Pulney bug came in, not only did many of us despise the enemy but we had not the present day knowledge of meeting it; with our hard bought experience it should not get ahead of the Shevaroy planters. As regards the respective merits of brushing and spraying it is found in actual working that the latter is not so effectual for "browning off" the bug "in lots" as brushing with Nicholson's mixture.

With Gossage's blue soap and refined saltpetre 1 lb. of each to 4 gallons of water, the spraying of *deciduous* trees is an easy matter; but with evergreen coffee Mr. A. G. Nicholson confesses that he only resorts to spraying as useful in keeping down the bug in bad patches, till the brushes can come round, as without an enormous expenditure of solution and care he has never succeeded in really getting perfectly clean trees by spraying. However, the most efficient solution he found for spraying is three pints liquid fuel (cost 1½ anna) to four gallons water, 1 lb. crude saltpetre (cost 2 as. 1 pie). Say, as an outside figure; 10 pies per gallon of solution.

He is now experimenting with a cheaper and what may prove even a more effective solution. It is made by putting shell lime into boiling water, adding liquid fuel in varying quantities and slowly stirring it in, while the whitewash is boiling; and straining and diluting to suit the sprayers and to be the strongest possible, without causing injury to foliage, spike or berry. Local conditions change, and it is very curious to note that on the Shevaroy's the coffee trees will stand much more solution than on the Nilgiris. This means that the bug can be killed on the Shevaroy's in 5 or 6 hours as 20 ozs. may be used, while on the Nilgiris, with only 1 lb. or under, the killing process may extend to 24 or 48 hours. With liquid fuel it is the same sort of thing on the Nilgiris—3 pints to 4 gallons will kill the bug, while on the Shevaroy's it has been found that a much stronger mixture is required to injure the trees; and then it does not satisfactorily kill the bug.

Brushing with the liquid fuel and saltpetre solution in the proportion of three pints liquid fuel and 1 lb. saltpetre to 4 gallons of water on the Nilgiris has given good results. It is useful in wet weather as, once dry, it does not wash off easily and retains a pungent smell for a considerable period; but it is slow and costly in labour application without the soap lather which is absolutely indispensable for quick work to enable the brushers to glide over the berries without injury, also to show the brushers by the white lather what branches have been brushed. This white lather lasts quite long enough to show the brushers what they are about; but it is, of course, of a rapid nature and a little chunam added to Nicholson's mixture, not strong enough to burn the brushers' fingers, yet sufficient to make a whitewash show, will be found useful, checking a day's work at a glance. Mr. Nicholson is now experimenting with the addition of liquid fuel in varying quantities to the soap and refined saltpetre solution to render it more effective, as it retains a strong smell for quite a length of time and does not

wash off so easily in wet weather ; but it calls for the addition of more soap to obtain the necessary lathering (in proportion to quantity of liquid fuel added), but he fears he would have to reduce the saltpetre and that would not do as all, on his theory that the droppings of the wash possess manurial value as a ferment to start nitrification in the soil, especially following on manuring with lime and phosphates, and also, as, our Scientific Officer states, proving to be destructive to the inimical bacteria in the soil. On "Hallacarry," where systematic brushing is carried on with the soap and saltpetre solution, which I was privileged to see in company with Mr. Nicholson, this theory is well supported by the appearance of the coffee. It need hardly be added that, whether spraying or brushing is resorted to, it should follow pruning during the first quarter of the year and handling at this time of year, to facilitate the operation of brushing and cheapen its cost; and every scrap of prunings and all *débris* about and weeds if possible, as recommended by the Scientific Officer, should be removed and cremated. By constant persistence in these repressive measures, backed by the best field work that can be put in, the bug attacks should not prove of a virulent type, and we have every hope of keeping it under control. It is essentially a dry weather pest, over which climatic conditions exercise, of course, a marked influence—or rather on the fungus which kills it wholesale—the wet starting the mildew. I brought down with me green leaves with the defunct bug taken from coffee where no spraying or brushing has been carried out and gave them to Mr. Anstead, who will tell you more about this natural enemy of the bug. It naturally follows that brushing or spraying must fall into line with seasonable conditions, such as will not cause any injury to spike or in wet weather (when it is of not so much value) and may possibly contend against the natural enemies of the bug. I do not enter into the cost of spraying or brushing, as relative data have been published in the *Planters' Chronicle*. Besides, it hinges on the solutions used, the state of the trees with regard to wood and foliage, the virulence of the attack, and the class of labour employed. But if any one wishes for any information I shall be glad to tell all I know. I hope there are few in here who are in need of the information.

Mr. R. D. Anstead said that the question of spraying *versus* brushing was largely one of labour. He thought undoubtedly spraying would be preferable to any method of brushing if they had European labour; but with cooly labour it was impossible to spray. The cooly did not like spraying and objected to pumping with one hand and spraying with the other. The cooly would not do it unless he was watched the whole time. That was why he (Mr. Anstead) had given up recommending spraying. On the other hand, the cooly would brush trees and rather like it. The difficulty was not one of expense but the difficulty of getting enough coolies.

BLACK ROT.

Mr. C. K. Pittock said that he had been asked by his Association to bring up the subject of "black rot" in coffee, and to ask the Scientific Officer to give a very prominent place in his programme to that question. His Association also asked him to invite discussion on the subject in view to find out what experiments, if any, had been carried out with "black rot" towards preventing, mitigating or curing that disease, and to ask the opinions of delegates at the Conference as to whether they thought that black rot was on the increase or decrease. It was the opinion of his Association that the disease had been far worse during the last four or five years than it had been previously.

Mr. Anstead read to the Conference what he had recommended some time ago in regard to "black rot." He would suggest, if South Mysore would

start, as he hoped they would, one of those experimental plots, that this subject might be taken on hand.

Mr. Danvers said that he was inclined to think that the reduced stamina of the trees had something to do with the spread of "black rot" which, he thought, was now on the increase.

Mr. Murray-Aynsley said that they had a little of it in his part of the country. The heavier the monsoon the worse was the rot. But he did not consider it to be worse now than it used to be.

Roads and Communications.

Mr. H. G. Parsons said :—

Gentlemen,—As regards communications and the question of a Railway, before I put my Resolution on the subject, I would like just to read to you what Lord Curzon told our deputation when they met him in 1902. He said :—

"Finally as regards Coorg, it may be that planters themselves attach so much value to this line and are so confident of its success that they would be prepared to tax themselves in order to provide a special guarantee to hasten its construction. I dare say that this is a point which you have not yet considered, and which I therefore do no more than submit to you on the present occasion. It enables me, however, to invest my reply with something of a practical nature ; since what I have said comes to this, that if you wait for the line to take its place in the Government Programme there will probably be some delay ; but that if you want to hurry on the construction, then it is for the various interested administrations or Committees to give a practical proof of their confidence in the commercial character of the undertaking by offering to back it in whole or in part themselves."

The Resolution I propose is as follows :—

"That the attention of the Government of India be drawn to Lord Curzon's reply to the Coorg Planters' deputation in August, 1902. That the Province practically unanimously offered a guarantee on the through line, as suggested by Lord Curzon. That Government have taken no steps to give effect to Lord Curzon's recommendation, and that the Hon'ble Mr. Fraser has expressed his opinion that the line will not be constructed for another 20 years."

Gentlemen, with reference to this Resolution, permit me to explain more fully. When we approached Lord Lansdowne, not to go further into ancient history, he told us that geographically no doubt a railway was indicated. Lord Elgin remarked that "everything comes to him who waits." The present Prime Minister advises those who wish to know too much to "wait and see."

Well, Sir, Planters are patient ; their industry spells patience—but "hope deferred maketh the heart sick"; the word "failure" is not in our dictionary. However, we waited, and then again appealed to Lord Curzon. His reply, we admit, was practical and encouraging. The next facer (we do not know what a knock-out is) was a refusal of Mysore and Malabar (Madras) to join us or to guarantee anything. However, confident in our endeavours and the soundness of our scheme, we set about finding the guarantee entirely ourselves. Meetings were held in every taluq ; the Commissioner and officials rendered us every assistance, and practically the whole of Coorg, European and Native, voted solid that we should guarantee 4 per cent. from Mysore to Tellicherry. According to the figures and statistics supplied to us, with which I will not burden you—we were convinced that any demand on us was a remote contingency, and railway administrations have the means of so regulating rates that we should get "favoured-nation" terms in regard to Coorg traffic in return for the guarantee. Although we had these suggestions from our Viceroy and although we have taken full advantage of his

advice, what, sir, is the result of it all ? A Coorg deputation approached Lord Minto ; we were told to support Renard Road Trains (which the Directors of the M. and S. M. Railway refused to support) and motor traction or cars. Is it unnatural if now just a little irritation reveals itself ? What are we to believe ? Why are we again put off ? History tells us that Governments are influenced at times by powerful interests. Some Railway Boards are stronger than others, and have a knack of getting their own way. But what are the duties of Government ? It is not only an Executive body, but more than that. Where the welfare of a large tract of country and its inhabitants is concerned, no Railway Company or other body should be permitted to subordinate the interests of the people to suit its own purposes. We are generally of opinion that the M. and S. M. Ry. desires no line from inland to the coast direct as between Calicut and Marmagao ; and with the Erode-Nanjangud extension to be constructed, their opposition will probably become more strenuous. But let us appeal to the Government of India and the Railway Board to at least be just to us.

Tellicherry, I may tell you, is some 100 to 200 miles nearer Aden than either Bombay or Karachi, and its potentialities would be worthy of attention to a passenger line of steamers. Our brother planters in Mysore, I gather from some friendly remarks made by Mr. Harris some time ago, would be only too pleased to claim our success in view of the "sporting offer" we have made, naturally wishing at the same time to have their own line. Personally, my opinion is that the M. and S. M. Ry., would view favourably any line into the interior provided it did not reach the coast. I may draw your attention to an interesting article in the *Daily Post* of the 27th July on Light Railways—which supports the views I have put forward—in South India, together with the Government's new terms of guarantee for branch lines, and I see in the Annual Report that Government have refused support to the Arsikere-Mangalore line if the construction by a private Company involved a guarantee. According to the new rules the Government guarantee $3\frac{1}{2}$ per cent., and we guarantee Government that rate. But here again what are we to understand ? From the Chairman's remarks there are other Associations that have been put off regarding bridges and roads ; but I would most earnestly urge any of those interested and suffering, not to cease from worrying until something is done : and if such a course is eventually forced on us, do not hesitate to make the matter to the House of Commons (I see that a question has already been asked by Mr. Kelly regarding the Arsikere-Mangalore line) ; publish our case, agitate, advertise, make known our requirements ; ask the Press to support us, and make known what we can do ; but under no circumstances resign ourselves to what some may think to be the inevitable. Forgive me for taking up so much of your time ; but a question of this nature must carry greater weight when backed by a united body, representing as it does to-day, and in this room, an enormous capital sunk in the industrial development of India. During the years I had the honour to be the Honorary Secretary of my Association, this question of railway communication was very dear to me, and the linking up of the beautiful little highland province of Coorg with the outside world would confer enormous benefits on that Province. Railways create traffic, and I am convinced that Coorg would be no exception. You will excuse a degree of enthusiasm, for no man can ever but look back with affection to and desire the prosperity of, a place where he has spent the best years of his life, and made many friends.

Mr. Tipping seconded the Resolution. The meeting then went into Committee, in which a long discussion of the subject took place, the British Resident and Mr. Couchman taking part in it.

The Resolution was put in open meeting and carried.

Miscellaneous Business.

As the Meeting closed only at 4-30 p.m. yesterday, it is impossible to review in this issue the whole of the proceedings.

A report of the miniature Exhibition held at the U. P. A. S. I. office is among the matters that must be deferred.

A few portions of the business transacted at the fourth and fifth days' sessions may be mentioned here.

Proposed Coffee Cess.—This scheme was backed up by a forcible resolution which urged upon Honorary Secretaries of District Planters' Associations, the prompt submission of the figures required by Government.

Proposed Pest Act.—The introduction of a Pest Act was advocated, and the Planting Member was requested to represent to certain officials the benefits that would accrue to *all* cultivators from the adoption of such a measure.

Imperial Preference.—A "creed" was formulated and adopted.

International Rubber Exhibition, 1911.—It was decided that advantage should be taken of this opportunity to make a good display of South Indian Rubber, and the Secretary was authorised to secure space, six delegates present guaranteeing the amount required for rental. A Committee was formed to undertake all necessary arrangements, and Mr. J. A. Richardson, who will be in England next year, was appointed delegate. The Committee comprises—Messrs. R. D. Tipping, J. A. Richardson, J. J. Murphy, L. G. Knight, and R. L. Gudgeon.

Labour Troubles.—The report laid before the 1909 meeting by the Labour Committee was adopted, and it was decided to request Government to pass an Act providing for :—

- (1) The appointment of a sufficient number of Protectors of Emigrants overseas.
- (2) The attestation of all contracts and agreements.
- (3) The compulsory appearance of all coolies emigrating overseas before a Protector of Emigrants who will satisfy himself that the coolies understand the true conditions under which they have been asked to emigrate.
- (4) The registration of all coolies, Maistries, Kanganies, and Recruiters connected with emigration or emigrating.
- (5) The imposition of penalties for infringing such provisions.

A Committee (comprising Messrs. Richardson, Mead, Tipping, Danvers, and Martin) was appointed for the purpose of instituting inquiries regarding fresh sources of labour supply.

S. I. P. B. F.—The rules of the Benevolent Fund were revised and amended.

Finance.—A Finance Committee was appointed, comprising the Chairman of the U. P. A. S. I., the Planting Member of Council and the Vice-Chairman, with the Secretary as *ex officio* member; and this Committee will also be the Committee of the Benevolent Fund.

Office-bearers, 1910-11.

A ballot resulted in the following appointments for the year 1910-11 :—

Chairman—Mr. R. D. Tipping (Coorg)

Vice-Chairman—Mr. C. H. Brock (Anamalais).

Secretary—Mr. Ormerod.

Notes and Comments by the Scientific Officer.

60. *A new Scale Insect*.—Specimens of a scale insect found on *Erythrina lithosperma*, the upper sides of the leaves of *Castilloa elastica*, and rapidly spreading on Coffee have been received from Kotagiri.

These Scales were sent to Mr. E. E. Green, the Government Entomologist, Ceylon, who has kindly identified them. Mr. Green writes as follows:—"The scale insects prove to be *Lecanium oleæ*, Bernard. It is an unusually large form of the insect. The species has not previously been recorded from the Indian continent."

This is apparently a new pest. The scale is deep brown to black in colour, and has a rounded outline, is very convex with ridges on the upper surface in the form of the letter H.

Shade trees, like *Erythrina*, badly attacked should be cut out and burned. The *Castilloa* each year sheds its leaves, and these should be gathered up and buried with lime, the land limed and forked, and generally cleaned up. Coffee attacked should be sprayed, and probably the Vermisapon mixture will be found useful for the purpose.

61. *Stump Rot in Tea*.—Referring to my Note, No. 57, on this subject, Mr. Petch, the Government Mycologist, Ceylon, writes:—"Our Tea root diseases, in order of prevalence are caused by,

Ustilina zonata, Déo.

Hymenochaete noxia, Berk.

Poria hypolateritia, Berk.

Botryodiplodia theobromæ, Pat.

Rosellinia bothrina B. & Br.

The first of these begins on dead *Grevillea* and Albizzia stumps."

Writing of the rot caused by *Symplocos spicata*, Mr. Petch says: "It was well known in Ceylon, seven years ago, that bushes died round *Symplocos* stumps, but I have not met with an example during the last five years. Carruthers puts it down to *Rosellinia*, but we have already split his *Rosellinia* into five, and I can't find out which of these starts from *Symplocos*. If you could send me the tap-root of a bush which has died near a *Symplocos* stump, I should be greatly obliged."

Will some planter please oblige by sending such a stump to my office together with a portion of the *Symplocos* stump which caused its death?

62. *Basic Superphosphate*.—Messrs. Parry and Co. write as follows on this subject:—

"With reference to the selling rate of Basic Superphosphate previously given by us at Rs.45-8-0 per ton, and quoted in the *Planters' Chronicle* (Vol. V., p. 129) by you, will you please note that the price as from the 1st August will be Rs.50 per ton on rails Ranipet? In every other particular the article remains unaltered. Our Basic Superphosphate is guaranteed to contain 12—13% of Phosphoric Acid soluble in Citric Acid, and about 40% of Lime. Packing is now in 2 cwt. gunnies."

RUDOLPH D. ANSTEAD,
Planting Expert.

The Planters' Chronicle.

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THE U. P. A. S. I.

(INCORPORATED.)

The Annual Meeting (*Concluded*).

FOURTH DAY—AUGUST 4, 1910.

Of the speeches delivered and papers read on this day it is only necessary to quote the following :—

Experiment Plots.

THE COMMITTEE'S REPORT.

This report, read by Mr. J. J. Murphy, was as follows :—

“ Your Committee appointed to consider the establishment by District Associations of Experiment Plots as suggested in the Scientific Officer's Annual Report have the honour to report as follows :—

“ The chief aims of the plan are :—

- (a) In the absence of a Botanic Station, to give the Scientific Officer places in each district where he can rely upon experiments he may suggest, or wish to try, being carried out in accordance with his wishes, and on the continuity of such experiments in his absence. A central Botanic Station is an impossibility on account of the widely differing crops, interests, climate, and soils existing in S. India.
- (b) To obtain reliable results from such experiments which will be comparable one with another, which is impossible when the experiments are conducted at a number of different places in a more or less haphazard way, as in the past.
- (c) To ensure the results of such experiments becoming public property for the good of the whole planting community.
- (d) To encourage and keep alive among the planters themselves an interest in the Scientific side of Agriculture, especially as applying to their own districts, and to give them a common interest in the field work of the Scientific Officer; and incidentally to strengthen the District Associations.

“ Your Committee makes the following recommendations :—

1. Each District Association to arrange for definite areas in the district, as typical of the general conditions as to soil, climate, rainfall, etc., as possible, on which simple experiments can be carried out. It is hoped that free offers of suitable land will be made by planters interested.

2. Each District Association to elect a Committee of working planters who will consult with the Scientific Officer about experiments to be carried out, and the method of their conduction. ❀

3. This Committee to undertake to see that these experiments are carried out exactly as arranged, and the results recorded, in accordance with a pre-arranged plan, over as long a period as may be necessary. This will ensure the continuity of such experiments on a definite system, which is essential if reliable results are to be obtained from them, and will remove the difficulty, which has existed in the past, that a Manager may go home before a series of experiments are finished and abandon them. In this event the Committee would take steps to see that the experiments were still carried out and the plan of them unaltered. Any one on whose estate such experiments were being conducted would give the Committee notice when he was leaving, and consult with them as to the arrangements to be made. In the same way any members of the Committee who might be leaving would give notice to that effect to the District Association and could be temporarily replaced by a substitute.

4. That the local Committees make the necessary arrangements for meeting any expenses in connection with such experiment plots. When the experiments are in danger of being abandoned for want of labour at a time when labour is short, the Committee will be expected to arrange for labour to be lent by different estates, each contributing a few coolies for instance.

5. It is proposed to conduct simple experiments, not elaborate ones, if possible in duplicate on different estates, such for example as:—

- a. The testing of the benefit of green dressings as compared with clean weeding.
 - b. Testing different kinds of green dressings.
 - c. Testing sprays, and methods of control for pests, such for instance as Black Rot.
 - d. Simple tests of fertilisers such as Nitrolim.
 - e. Tests to discover the best time to apply manures, and the best quantities to apply.
 - f. The effect of Nitrate of Soda on latex yield.
 - g. Methods of tapping and coagulation.
 - h. Hybridisation of Coffee and Manihots.
- etc. etc. etc."

Vote of Thanks.

Mr. C. E. Abbott, in proposing a hearty vote of thanks to the Chairman, said:—Gentlemen,—You may be alarmed at seeing me rise again; but this is the last time, and it is the pleasantest occasion as, in spite of several disappointments, I am at last quite confident of carrying the meeting unanimously with me. I have been asked to propose a vote of thanks to you, Sir, for the work you have done for the Association during the past year, and for the manner in which you have presided over this Meeting. I know it will be a very hearty vote of thanks. You have had a great deal of work to do before we came here, and have had a long meeting to manage; and we all feel we are very fortunate in having you here to get several difficult matters settled. I am sure it is not necessary for me to say anything more.

The Chairman's Closing Address.

Gentlemen,—I have to thank you, Mr. Abbott, for the very kind things you have said about me and can only assure you that it has been a great pleasure to me to be your Chairman, and I must thank the delegates and other gentlemen who have spoken here for their support and the considera-

tion they have given me in the discharge of my duties. We have had, I think, an interesting and instructive Meeting, which was in no small degree due to the efforts of our Scientific Officer, whose keenness I trust will be backed up by District Associations, which will enable him to make the experiments he proposes to carry out in the way of manuring and cultivation. It is satisfactory to know that the Laboratory is now assured, and I may mention that the order for instruments, etc., has been cabled, so that our energetic Secretary is not letting the grass grow under his feet. The matter of what we are going to do with the large crops of rubber seed is one which I hope will have the attention of Associations interested and I trust will lead to some practical result. We are sorry Mr. Hodgson was unable to attend our Meeting this year, more particularly as he is just about to retire from India, and I would like to put on record our appreciation of his services during the eight years he acted as our Planting Member on the Legislative Council, and wish him all good luck on his retiring from active work in India.

Our discussions on labour matters have been most friendly, and I think the chief point of danger has been recognised, and I trust the move we have made, though, as Mr. Martin remarked, it is only a small step, is in the right direction. There is one point which came up before the Meeting on which I have been asked to give an expression of opinion, and that is with regard to reporting of speeches. I should like to make it quite clear that the U. P. A. Book of Proceedings is the only official record of our debates, and we cannot be held responsible for any other reports. As a rule, important speeches are submitted to the speakers for revision in case of mistakes, when written copies are not handed in, but no alterations of facts will be allowed. I may give it as my opinion that if speakers make any but trivial alterations, it is their duty to make them publicly as well as in our records. Our little exhibition of produce I think has been most encouraging, and promises to be very much larger another year, when more notice will be given. The rubber exhibits were most interesting, including samples from the Straits and Java. The only sample of machine-made rubber from South India was from the Rani Rubber Co., but there were a large number of sheets and biscuits of Pará, Ceará, and Castillon, which made a very fine show.

Coffee samples were few, as crops had all been shipped and only one or two samples were available. I was disappointed that there were so few tea samples, but this was, I think, principally due to the very short notice given, and I hope will be remedied next year.

Mr. Ainstead has a large collection of leguminous plants and herbarium specimens, and Mr. Hamilton's collection of hybridized coffee leaves were most interesting, and our thanks are due to the two gentlemen for the time and trouble they must have spent over the preparing of these specimens. Our thanks are due to the Press of the Presidency for the valuable space they have allotted us in their columns, not only for this particular Meeting, but throughout the year, and we would like to tender our thanks to Mr. C. V. Munisawmy Iyer, our Official Reporter, for the work he has done for us during the Meeting.

In closing, gentlemen, I wish, on behalf of the Association, but most particularly on my own behalf, to thank Mr. Ormerod for all he has done for the Association and what he has done for me personally in lightening my work as Chairman.

The Chairman then declared the meeting dissolved.

Memo. of Resolutions.**THE SCIENTIFIC OFFICER.**

1. That Messrs. Pittock, Mead, Murphy and Anstead be appointed a Committee to draw up a programme for the Scientific Officer for 1910-11.—*Carried unanimously.*

EXPERIMENT PLOTS.

2. That the following gentlemen be appointed a Committee to draw up a scheme regarding experimental manuring to lay before District Associations, and to report the result on Thursday morning:—Messrs. Tipping, Murphy, Danvers, Malcolm, Barber, Pittock, and Anstead.—*Carried unanimously.*

GOVERNMENT PURCHASES OF CINCHONA.

3. That, whereas the cultivation of Cinchona in India is rapidly disappearing, and, consequently, the supply of Quinine in India, which is so vitally important to the country, is becoming dependent upon bark grown in a foreign country, and whereas such a state of affairs is courting not only the possibility but the probability of a quinine famine in India at any future time, this Association request the Government of Madras to fix a minimum price of one anna per unit for the purchase on their Bark from all such estates or groups of estates as are prepared on their part to at least maintain the effective areas of their existing Cinchona Plantations, and who guarantee to give Government the first offer of their Bark at rates up to a maximum of two annas per unit.—*Carried unanimously.*

THE PEPPER-VINE DISEASE.

4. That the very hearty thanks of this Association be given to the Government of India for lending the services of Mr. McRae, the Officiating Imperial Mycologist, to investigate the Pepper-Vine disease, and to Mr. McRae and Mr. Anstead for all the trouble they have taken in their investigation.—*Carried unanimously.*

THE KING EDWARD MEMORIAL.

5. That the matter of subscriptions to the All-India Memorial be referred without delay to the District Planters' Associations.—*Carried unanimously.*

CATTLE DISEASES.

6. That this Association expresses its appreciation of the steps taken by Government to mitigate rinderpest and anthrax, by the appointment of Veterinary Assistants for inoculating animals against the diseases, and at the same time would suggest that measures should be taken for the destruction of the carcasses of animals which may die of infectious disease on the main roads.—*Carried unanimously.*

ACT I OF 1903.

7. That this Association, in view of the refusal of those districts that have not hitherto adopted Act I of 1903 to accept it, considers that at future meetings the subject of Act I should not appear on the Agenda paper except under the conditions of rule 10 of the U.P.A.S.I.—*Carried unanimously.*

EXTRADITION.

8. That the Government of Madras be approached with the view of ascertaining clearly whether Extradition will be automatically obtained on the adoption of Act I of 1903 by Planters in Native States, or whether it would be necessary to have special alterations made in existing treaties with such States.—*Carried unanimously.*

LABORATORY FOR THE SCIENTIFIC OFFICER.

9. That this Association approves of and confirms the action of the Secretary in securing the necessary accommodation, adjoining his Office, for the Scientific Officer's Laboratory, and that in accordance with the Scientific Officer's estimate a sum of Rs.2,500 be raised amongst the District Associations and individual Planters for equipping the Laboratory, the manner in which the necessary funds are to be collected to be decided at this meeting. That in view of the urgency for providing the necessary appliances with as little delay as possible, a sufficient sum be allotted from the U. P. A. Reserve Fund, which shall be repaid when the donations are realised.
—*Carried unanimously.*

HYBRIDISATION OF COFFEE.

10. That in view of the decreasing yield, poor quality, and increased liability to diseases of our present strain of coffee, the U. P. A. S. I. and the Scientific Officer be asked to persevere with experiments in Hybridisation steadfastly.

That an endeavour be made to ascertain by searching inquiries, the quality, bearing capabilities, freedom from diseases, and general suitability of some of the new varieties, with a view to the procuring of seed for distribution, on payment, to the various Associations; and that the Scientific Officer be asked to determine as far as possible what constitutes a good sample, to inquire into the important question of the essential oil of Coffee, and to generally advise us on the whole question of deteriorated quality.
—*Carried unanimously.*

ROADS AND COMMUNICATIONS.

11. That the attention of the Government of India be drawn to Lord Curzon's reply to the Coorg Planters' deputation in August, 1902. That the Province practically unanimously offered a guarantee on the through line as suggested by Lord Curzon. That Government have taken no steps to give effect to Lord Curzon's recommendation, and that the Hon'ble Mr. Fraser has expressed his opinion that the line will not be constructed for another twenty years.—*Carried.*

THE THENI BRIDGE.

12. That this Association thanks the Government of Madras for sanctioning the construction of the Bridge across the Theni River, in Madura District, and for providing a moiety of the estimated cost of the work from Provincial Funds.—*Carried.*

VAIGAY VALLEY RAILWAY.

13. That this Association urge upon the District Board of Madura the necessity for taking in hand, at an early date, the construction of the Vaigay Valley Railway, for which they have facilities in the shape of the Railway Cess already collected, and to be collected annually in future until the necessity for it ceases.—*Carried.*

ATTUR-TANDIGUDI ROAD.

14. That the Secretary be requested to find out what steps have been taken with regard to the resolution passed by this Association two years ago.—*Carried.*

[This resolution was substituted for one reading as follows, which was withdrawn:—

That this Association request that the Government of Madras do make a special grant to the Madura District Board to enable that Board to carry

out the necessary repairs and for the upkeep of the Attur-Tandigudi road, a road which is important to planting and other interests.]

CEYLON IMPORT DUTY ON TEA.

15. That this Association, having failed to obtain the abolition of the Ceylon Import Duty on Tea through the Government of India, do request Sir J. D. Rees, M.P., to bring to the notice of the House of Commons the disabilities and disadvantages caused to South Indian planters by the retention of the duty.—*Carried unanimously.*

BONUS ON GREEN TEA.

16. That the U. P. A. S. I. approach the Indian Tea Cess Committee and request that a bonus of 6 pies per pound on 4 million pounds of green tea be allotted from the funds at the disposal of the Committee in order to encourage what it may be reasonably hoped will become a self-supporting and expanding industry in the near future.—*Carried.*

[The following Amendment to the above was put forward and rejected :

“That this Association express its satisfaction at the prospect of the immediate restarting of the green tea industry in Southern India, do place on record its appreciation of the action of Messrs. Harrisons & Crosfield, Ltd., in promising to establish a finishing factory in Southern India, and further do approach the Indian Tea Cess Committee asking them to allot from the funds at the disposal a sum of Rs.1½ lakhs to be utilized, in the first place, in advertising the produce of what may be confidently expected will be a self-supporting and expanding industry from its inception.”]

COFFEE CURING.

17. That Coffee Curers be once more approached with a view to their further reducing the charges and bringing them into line with the terms offered by Messrs. Volkart Bros., and that they be asked whether they cannot make improvements in the Curing machinery in the event of their being unable to make a reduction.—*Carried unanimously.*

PROPOSED CESS ON COFFEE EXPORTED FROM INDIA.

18. That in view of the letter dated 16th December from the Secretary to the Government of Madras, Revenue Department, which reads as follows :—“In continuation of Mr. Wynch's letter No. 2880 dated 20th October 1909 informing you that your letter of the 5th idem containing the representations of the Association on the subject of the levy of a cess on coffee exported from this country has been forwarded to the Government of India, I am directed to request that you will be good enough to furnish further evidence that the Association's proposals in favour of a cess on coffee command the approval and support of the bulk of the coffee-planters of Southern India whose produce would be affected by it. The Association may, perhaps, be unable to supply complete statistics of the coffee-producing area under cultivation, but some approximate figures proving that the demand for a coffee cess has the support of a very decided majority of coffee planters, whether Members of the United Planters' Association of Southern India or not, are necessary before His Excellency in Council could give the proposal his support,” Secretaries of District Associations be requested to send in, at an early date the Statistics called for by Government to the Secretary, who is requested to submit these figures to Government together with a reiteration of our reasons for asking for this Cess, and that the Planting Member of Council be asked to press this subject on the attention of Government with a view to the Cess being imposed at an early date.—*Carried unanimously.*

WEIGHTS AND MEASURES.

19. That this Association, realizing that the Madras Government have done all that is reasonable for the present on the subject of the standardization of Measures, now urge upon the Government of India the necessity for the standardization of Weights throughout the country.—*Carried.*

[This was originally an amendment to the following resolution :—

“ That this Association do adopt the proposals of Mr. Richards, Collector of Bangalore, with regard to the standardization of weights and measures, and do press for their general adoption throughout the country in spite of all opposition past and to come.”

The amendment was adopted and became the substantive resolution, the original proposition being rejected.]

PROPOSED PEST ACT.

20. That this Association is strongly in favour of the introduction of a Pest Act into Southern India, and that the Planting Member be asked to interview the heads of Government Departments before whom the consideration of a Pest Act would come, and to point out to them the benefit that would accrue to *all* cultivation from the adoption of such a measure.—*Carried unanimously.*

IMPERIAL PREFERENTIAL TARIFF,

21. That this Association do affirm its complete adherence to the following Creed with regard to Imperial Preferential Tariff :—

- (a) We believe that the British-grown *Coffee* will be benefited by a preference in duty, and that it is sufficient in quantity for the consumption of the Empire.
- (b) We believe that a preference in duty in favour of British-grown *Tea* will have the effect of displacing inferior teas; and, by giving the citizens of the Empire a wholesomer and better beverage, the moral and physical condition of the poorer classes will be improved.
- (c) We believe that a preferential treatment for *Rubber* will, in the near future, prove of inestimable value to an industry in which millions of British Capital have been and are being invested.
- (d) We believe that a preferential tariff for *Cinchona Bark* and *Quinine* is a matter of Imperial importance, and should receive the attention of every far-seeing British Statesman.
- (e) We believe that preference with *Cocoa* would remove the possibility of such a pitiful scandal as the one with which the names of reputable British firms were recently connected.
- (f) We believe that attention has not been sufficiently called to the danger to Great Britain and the Empire incurred by relying to such a very great extent on the supply of Cotton from the United States of America, and that a preferential treatment for British-grown *Cotton*, by encouraging adequate production within the Empire, is the only way to safeguard the interests of Lancashire for all time.
- (g) We believe that British-grown *Wheat* is necessary in sufficient quantities to meet the consumption of the Empire, and so save any part of it from the possibility of starvation in time of war, and that the only means to attain this ideal result is by giving British-grown Wheat a preference.

- (h) We believe that a complete Imperial Preference Tariff is essential to the maintenance of the power and prosperity of the British Empire, and that every effort ought to be made to render the Empire Self-supporting.
- (i) We believe that the sentiment that would be engendered by a Preferential Tariff throughout the Empire would prove to be an Imperial Asset and a bond of union of even greater value than the benefits that would arise from its Commercial aspect :

And that this Association do communicate these views to all other Associations, Public and Private Bodies, Members of Parliament and Legislative Councillors throughout the Empire, asking for their opinions and for their active co-operation in furthering the cause of Imperial Tariff Reform.
—*Carried, nem. con.*

THE INTERNATIONAL RUBBER EXHIBITION, 1911.

22. That this Association do decide to support the Rubber Exhibition of 1911 to be held in London. That the Secretary be asked to arrange for space at the International Rubber Exhibition either by letter or by cablé. That Mr. Richardson be requested to be our delegate ; that a Committee be formed to undertake all necessary arrangements in connection with the exhibition ; and that the Association be indemnified against loss by the delegates of those Associations largely interested in rubber.—*Carried, nem. con.*

23. That the following gentlemen be on the Committee for the Rubber Exhibition :—Messrs. Tipping, Richardson, Murphy, Knight, and Gudgeon.
—*Carried, nem. con.*

LABOUR.

EMIGRATION.

24. That this Association adopt the report of the Committee put before it at the meeting last year, and request Government through the proper channels to pass an Act providing for

1. The appointment of a sufficient number of Protectors of Emigrants overseas.
2. The attestation of all contracts and agreements.
3. The compulsory appearance of all coolies emigrating overseas before a Protector of Emigrants who will satisfy himself that the coolies understand the true conditions under which they have been asked to emigrate.
4. The registration of all Coolies, Maistries, Kanganies and Recruiters connected with emigration or emigrating.
5. The imposition of penalties for infringing such provisions.—*Carried.*

[The undernoted Amendment was proposed, and lost :—

“That this Association is of the opinion that some form of compulsory Registration of Plantation Labour both for work in India and for Emigration has become necessary in order to regulate the conditions of Labour Recruiting.”]

SOURCES OF SUPPLY.

25. That a determined effort be made by the Planting Committee of Southern India to tap fresh sources of labour ; and that a representative Committee be appointed for the purpose of acquiring information on the subject.—*Carried.*

26. That Messrs, Richardson, Mead, Tipping, Danvers, and Martin constitute the Committee for inquiring into fresh sources of Labour Supply.—*Carried unanimously.*

NON-SERVICE OF WARRANTS.

27. That this Association place on record its opinion that the non-service of warrants under Act I of 1903 and Act XIII of 1859 is still of frequent occurrence in the Coimbatore District and Mysore; and request that Governments concerned increase the police force in those districts in which labour is largely recruited for plantation work.—*Carried unanimously.*

ACT XIII OF 1859.

28. That the Secretary be instructed to reply to the inquiry of the Government of Madras in the following terms:—"The Members of District Associations do not appeal to Act XIII of 1859 when they have reason to believe that the defaulter has absconded to Native States, as under present conditions it would be only a waste of time, but the U.P.A.S.I. is of opinion that if Act XIII of 1859 included a clause to provide for their arrest in such cases it would be desirable, and is further of opinion that this privilege should be reciprocal."—*Carried unanimously.*

ATTESTATION OF AGREEMENTS.

29. That, whereas it appears that coolies and maistries experience a considerable amount of delay and trouble in having their agreements attested by the Attesting Officers appointed for this duty under Act I of 1903 in the Mysore State, this Association requests the Government of Mysore to issue stringent orders to all attesting officers impressing on them the absolute necessity of promptly and diligently attending to contracts presented to them for attestation and of not hampering coolies or maistries with any sort of vexatious delay or expense.—*Carried, nem. con.*

PREVENTION OF THEFT OF PLANTING PRODUCTS.

30. That in view of the increasing production of Rubber, Tea and Pepper and Cardamoms in Southern India, it is considered advisable to ask Government to pass some enactment for the protection of these products from theft both on the Plantation and in transit to the Coast, an enactment similar to the Coffee-Stealing Prevention Act being considered suitable.—*Carried unanimously.*

THE S. I. P. B. F.

31. That the Rules of the S. I. Planters' Benevolent Fund be adopted in their amended form, and that printed copies of these rules be supplied to all Members of this Association.—*Carried unanimously.*

ADDITION TO RULE vii.

32. That delegates of the previous year be admitted in like manner for one year only.—*Carried.*

[This was originally an amendment to a resolution that all ex-delegates should be included within the scope of Rule vii.]

AUDIT.

34. That the selection of Mr. W. H. Haldwell as auditor as last year's accounts be confirmed, and that the audited statement of accounts presented by the Secretary be passed.—*Carried unanimously.*

35. That Mr. W. H. Haldwell be appointed auditor of the U.P.A.S.I. Accounts for the current year.—*Carried*

FINANCE.

F1. That the Finance Committee and Committee of the Benevolent Fund shall consist of the Planting Member of Council, the Chairman of the U. P. A. S. I., and the Vice-Chairman, with the Secretary as *ex-officio* Member.—*Carried.*

F2. That, in addition to the present current banking account with the Bank of Madras, Bangalore, a current account be opened with the Mercantile Bank of India, Limited, in Madras, more particularly with a view to (1) economy in the encashment of cheques on Madras and the purchase of bills on London; and (2) convenience of handling the Scientific Officer Fund.

F3. That the moneys of the Southern India Planters' Benevolent Fund be banked or otherwise invested in the name of the U. P. A. S. I., any current account opened in this behalf to be specially marked "S. I. P. B. F. account."

F4. That the current banking account of the S. I. P. B. F. be opened and maintained with the Bank of Madras, Madras.

F5. That the Secretary to the U. P. A. S. I. for the time being be, and he hereby is, confirmed in his appointment as Honorary Secretary to the Southern India Planters' Benevolent Fund, and that he be, and he hereby is, appointed also Treasurer of that Fund and given authority to operate on the current account specially designated "S. I. P. B. F. account" in the name of this Association and as its Secretary.

F6. That the Finance Committee of the Association for the time being be, and they hereby are, authorized to pledge on behalf of the Association and for its use any of its properties or securities of whatsoever kind for the purpose of arranging with its bankers for any overdraft that the said Committee may deem to be necessary from time to time, the maximum limit of such overdraft being fixed at Rupees one thousand.

F7. That the Secretary be, and he hereby is, authorised to utilise temporarily any portion of the Reserve Fund of the Association that may be required to facilitate the fitting up of the Laboratory sanctioned for the Scientific Officer, any moneys so used to be replaced in the Reserve Fund as soon as collections on behalf of the Scientific Officer Fund will permit.

F8. That the Finance Committee of the Association for the time being be authorised to invest in fixed deposit any sum that they consider may be safely added to the Reserve Fund of the Association and also in Government securities any part of the Southern India Planters' Benevolent Fund which in the opinion of the Committee may be safely withdrawn from current account.—Nos. 2/5 *Carried unanimously, en bloc.*

The Miniature Exhibition.

This little "side-show" to the Annual Meeting was—though very small and arranged hastily and under great disadvantages for want of suitable tables, exhibition cases, &c.—distinctly successful for a first effort. Of Rubber particularly there was a very interesting display, samples having been sent in from several estates in Travancore, Cochin, the Nilgiris, the Shevaroy, and Mysore. No prizes were awarded, so comparisons are not called for. It should be said, however, that the Rani Rubber Company, Ltd., showed finest thin pale crepe, thin medium crepe, gristly sheet crepe, thick gristly crepe and scrap—all machine-made and excellent. Venture Estate sent some fine biscuits (Ceará), while Eldorado Estate supplied specimens of Pará sheet and biscuit. Hailyburia Estate, Peermade, contributed Ceará sheet, and Palapilly Estate, Cochin, Pará sheet and biscuits. There were samples of Pará sheet also from the Travancore Rubber Company.

The Nilgiri specimens comprised smoked and unsmoked Pará and Castilloa from Glenburn Estate, which were especially noteworthy as the product of trees *grown at an elevation of 3,500 feet*. These were exhibited by Mr. A. G. Nicholson, The Indian Peninsula Rubber and Tea Estates, Limited.

A neat little show case from the Shevaroy's, (Brooklands Estate) brought down by Mr. C. Dickins, showed what can be done in those Hills in the production of Ceará Biscuits.

Aglatti Estate, Munzerabad, Mysore, sent Ceará sheet and biscuit; and a few stray samples of tain Ceará rubber from the estate of the Hon'ble Mr. J. G. Hamilton were thrown into the general collection, though they had not been brought down for the purposes of the Exhibition.

This will suffice to show the representative character of the exhibits in "the Rubber section."

Samples of Tea arrived from only three estates in time for the Exhibition (a fourth estate's selections having been delayed), and the tea-tasting and judging that had been intended did not take place, because of the small "field."

Coffee from Coorg and the Shevaroy's was not of qualities to call for special remark, the fact being that there were few samples left on estates by the time that notice of the Exhibition was given.

Coorg exhibited a small show of Pepper, and the Shevaroy's one of Cardamoms; but these, also, need only be mentioned very briefly.

The Hon'ble Mr. J. G. Hamilton, Planting Member, exhibited a large series of Coffee leaves illustrating his remarks made at the meeting on the subject of Coffee Hybridisation. At the beginning of the series were specimens showing the type of leaf produced by pure species of *Arabica*, both of the ordinary variety and the Coorg variety, of *Liberica*, *robusta*, Jamaica Coffee, and Nyasaland Coffee. This collection was followed by a series of leaves of the *Arabica-Liberica* hybrids, of the 2nd, 3rd, 4th, and 5th generations, showing very clearly how selection and breeding had produced good types now under observation, and at the same time some of the sports from the desired type. The whole collection was most interesting and well displayed, and it is to be hoped that at some future exhibition Mr. Hamilton will be able to exhibit a similar series of finished coffee.

Mr. Hamilton also exhibited a series of leaves illustrating the differences between Ceará Rubber (*Manihot Glaziovii*) and the Manicoba varieties, *Manihot dichotoma*, *M. piahyensis* and *M. heptaphylla*.

The three kinds of spraying machines mentioned in the *Planters' Chronicle* (Vol. V, p. 333) were on view, as well as a sample of *Nitrolin*, the new Nitrogenous fertiliser about which the Scientific Officer read a paper at the meeting.

The Scientific Officer exhibited herbarium specimens of a number of leguminous plants collected in South India. This collection promoted a great deal of interest and discussion, and its value was much enhanced by the kindness of Mr. G. H. Krumbiegel, the Economic Botanist and Superintendent of the Mysore Gardens, who was good enough to exhibit living specimens of *Clitoria cajanifolia*, *Indigofera glandulosa*, and five different kinds of *Crotalaria*, suitable for green dressings, as well as a number of herbarium specimens and drawings of leguminous plants to be found in India.

The following is a list of the leguminous plants of which herbarium specimens prepared by the Scientific Officer were exhibited :—

No.	BOTANICAL NAME.	LOCAL NAME.	DISTRICT.
3.	<i>Cassia mimosoides</i> , L.	... Poot Hulloo.	(Mysore. Wynaad. Nilgiris.
4.	<i>Cassia Tora</i> , L.	... Choughty Gidda....	All.
10.	<i>Cassia occidentalis</i> , L.	... Karri Choughty Gidda.	... "
41.	<i>Cassia hirsuta</i> , L. fils.	... Choukati.	... Coorg.
57.	<i>Sophora glauca</i> , Lesch.	... ..	( Shevaroyes. Nilgiris.
40.	<i>Pithecolobium dulce</i>.	... Korukapali.	... Bangalore.
49.	<i>Pithecolobium saman</i>.	... Rain Tree.	... All.
5.	<i>Crotalaria quinquefolia</i> , L.	... Gilkie Gidda.	(Mysore. Coorg.
8.	<i>Crotalaria nana</i> , Burm.	... Card Menthoo.	... Mysore.
43.	<i>Crotalaria verrucosa</i> , L.	... ..	Mysore.
27.	<i>Crotalaria chinensis</i> , L.	... ..	Wynaad.
28.	<i>Crotalaria retusa</i> , L.	... ..	All.
47.	<i>Crotalaria iburnifolia</i> , L.	... Seemy ubchenoo...	Mysore.
48.	<i>Crotalaria Roxburghiana</i> , D.C.	... Card ubchenoo.	Mysore.
6.	<i>Tephrosia tinctoria</i> , Pers.	... Gworie Gidda.	... All.
11.	<i>Tephrosia purpurea</i> , Pers.	... Oogin Gidda.	(Shevaroyes. Mysore.
9.	<i>Indigofera tinctoria</i> , L.	... Yairdce Biloo.	(Mysore. Coorg. Wynaad.
18.	<i>Indigofera trifoliata</i> , L.	... ..	Mysore.
13.	<i>Sesbania aculeata</i> , Pers.	... Doond Ulli.	... Mysore.
20.	<i>Sesbania aegyptiaca</i>	... Pulian nellie.	... Wynaad.
1.	<i>Desmodium laxiflorum</i> , D. C.	... Karri ootrani.	... Mysore.
2.	<i>Desmodium triquetrum</i> , D. C.	... Kemp ootrani.	... Mysore.
14.	<i>Desmodium heterophyllum</i> , D. C.	... Touravai Gidda.	... Mysore.
15.	<i>Desmodium triflorum</i> , D. C.	... ..	All.
22.	<i>Desmodium polycarpum</i> , D. C.	... ..	Wynaad.
46.	<i>Desmodium polycarpum</i> , var. trichocaulon.	... ..	Mysore.
58.	<i>Desmodium rufescens</i> , D. C.	... ..	Shevaroyes.
17.	<i>Smithia sensitiva</i> , Ait.	... ..	Mysore.
24.	<i>Smithia geminiflora</i> , Roth.	... ..	All.
19.	<i>Alysicarpus vaginalis</i> , D. C.	... ..	Mysore.
32.	<i>Dalbergia Sissoo</i> , Roxb.	... Rose Wood.	... Mysore.
39.	<i>Pongamia glabra</i> , Vent.	... Honge.	... Mysore.
44.	<i>Phascolus Mungo</i> , L.	... Mati Kalai.	... Mysore.
45.	<i>Dolichos falcatus</i> , Klein.	... Holi Biloo.	... Mysore.
62.	<i>Atylosia Candollei</i> , W. & A.	(Thovarai. Kardaverai.	(Nilgiris.
65.	<i>Clitoria cajanifolia</i>	... ..	Ceylon,
12.	<i>Geissapsis cristata</i> , W. & A.	... Hoolie Gidda.	... Mysore.
16.	<i>Pseudarthria viscida</i> , W. & A.	... ..	Mysore.
54.	<i>Pycnospora hedysaroides</i> , R. Br...	... ..	Travancore.

Scientific Officer's Papers.**XXXVIII.—NITROLIM.**

Priestley and Cavendish in 1785 were the first to discover that the Nitrogen and Oxygen, which exist in the atmosphere as separate gases, could be made to combine with one another under the influence of the electric spark to form a nitrogenous compound.

Since that time the possibility of preparing such compounds, and drawing on the enormous supplies of Nitrogen in the atmosphere, for agricultural purposes, has occupied the attention of many experimenters.

It is only within comparatively recent years, however, that such attempts have been successful on a commercial scale.

Nitrogen is the most expensive of all fertilising constituents, and the supply is chiefly obtained from nitrate deposits in various parts of the world. These deposits have been drawn upon very heavily, and no new ones have been found, and it has been estimated that at the present rate of consumption they will be exhausted in a generation or so. The discovery that the Nitrogen of the atmosphere can be utilised removes all anxiety on this score.

The realisation of this fact on a commercial scale dates from 1903, when Dr. Frank, of Charlottenburg, discovered that Calcium Carbide could be made to absorb atmospheric Nitrogen and form Calcium Cyanamide, which could be used as a nitrogenous fertiliser and was comparable in value with Sulphate of Ammonia and Nitrate of Soda.

This substance, under the trade name of Nitrolim, is now being manufactured on a large scale by eleven companies with a working capacity of about 150,000 tons a year, and in a few years this output will probably be doubled.

Nitrolim is a heavy, dark, very fine powder, something like Basic Slag in appearance. An analysis of it made by Dr. Voelcker gave the following figures:—

Calcium Cyanamide	58'91
Free Lime	23'55
Magnesia	0'05
Oxides of Iron and Alumina	2'44
Silicious matter (insoluble)	2'19
Carbon	12'86
	100'00
Nitrogen	20'62

It is therefore practically a mixture of Calcium Cyanamide and free Lime. The commercial product is guaranteed to contain 18% of Nitrogen and 20% of free Lime.

In solution in water Calcium Cyanamide is slowly split up into Calcium Hydrate and Ammonia and similar products. In the soil this change takes place more rapidly, and proceeds further. The Calcium finally forms Calcium Carbonate, and the Nitrogen forms Ammonium Carbonate which is then acted upon by soil bacteria, and converted into Nitrates.

Consequently this fertiliser is a basic one, supplying not only Nitrogen but at the same time a dressing of Lime, and for this reason it should prove a very suitable and valuable manure for South Indian soils, which are nearly all deficient in Lime, and to which Lime must be added to gain the full advantage from applications of Sulphate of Ammonia and Superphosphate.

It is in the form of such a fine powder that, when applied by itself, it should be mixed with sand or dry earth in order to make it more easy to

handle. An application of 1 to 2 cwt. per acre should be used, broadcasted, and lightly worked into the soil at a period of light rains, say in March or September in most districts.

It can also be used in mixtures to form complete fertilisers, but it must be remembered that on account of the free Lime it contains it must not be mixed with Sulphate of Ammonia or organic manures. It may be safely mixed with Basic Slag, Bone Meal, and Sulphate of Potash, and even with Superphosphate if certain precautions are taken. This is not altogether a desirable mixture, however, for the free Lime in the Nitrolim is apt to cause the Phosphoric acid in the Superphosphate to 'revert' (See *P. C.*, Vol. V., p. 54) and the mixture will get hot and have to be watered, using 15 to 20 parts of water to every 100 parts of the mixture, to facilitate the operation. Though not a good mixture it can be used without much loss of Superphosphate so long as the proportion of Nitrolim does not exceed 20%.

A suitable mixture for most purposes was given in the *P. C.*, Vol. V., p. 366, *viz* :—

5 Basic Slag: 3 Sulphate of Potash: 4 Nitrolim.

This will yield a fertiliser containing about 7.5% of available Phosphoric Acid, 11% of Potash, and 6% of Nitrogen, which should be applied at the rate of 6 cwt. per acre. Other mixtures, suited to special crops and soils, can be easily made.

Messrs. Peirce, Leslie & Co., Ltd., have secured the agency for Nitrolim in South India and they quote a price for it of Rs.200 per ton, Calicut delivery, the fertiliser being put up in double bags each containing 2 cwt. Messrs. Parry & Co. also stock this fertiliser.

The value of Nitrolim is based upon its Nitrogen content, and unit for unit its price compares favourably with that of Sulphate of Ammonia and Nitrate of Soda; taking Messrs. Peirce, Leslie & Co's prices we get the following figures :—

	Guaranteed Nitrogen content.	Price per ton.	Cost of a unit of Nitrogen.
Sulphate of Ammonia	... 20%	Rs.250	8'92 as.
Nitrate of Soda	... 15%	.. 230	- 10'92 as.
Nitrolim	... 18%	.. 200	7'93 as.

In addition Nitrolim has the advantage of being basic and containing free Lime.

RUDOLPH D. ANSTEAD, *Planting Expert.*

It has been decided by the Government of Madras to discontinue from the 15th October 1910 the sale of seven-grain quinine powders in this Presidency and to issue in their stead ten-grain powders for sale at the original rate of 3 pies per powder.

—:O:—

Consul S. C. Reat writes from Tamsui, March 26, on this year's yield of tea in Formosa :

"The tea season set in very late last year owing to the continued cold weather. But this year there has been plenty of rain, and the temperature is gradually rising. If the season advances without any sudden changes, some samples of tea of this year will appear in the market at the end of this month or the beginning of April.

"Judging from the present state of the growth of tea, it is predicted that this year's tea will be rather better than last year's respecting flavour, colour and shape. The tea merchants of Daitotei have decreased in number during the last few years, but that apparently indicates the union of small tradesmen, owing to the requirements of financial conditions."

CORRESPONDENCE.

Deterioration of Coffee.

The Editor of the *Planters' Chronicle*.

Sir,—In your issue of May [28th] last Mr. Ferguson of, Polli Betta, suggests that the deterioration of Coorg and Mysore Coffee is due to the want of an "Essential Oil" in the bean, and in support of his theory quotes the experience of a Coorg planter who had as a Curer noticed the large amount of "oil" in the Coffee, in the years gone by and the total want of it at the present time. But the Planting Expert says it would take years of laboratory work to determine this and he suggests that the opinion and experience of Planters should be obtained on the subject.

Dr. Lehmann took some steps to try and elucidate the point and to determine on what qualities the value of Coffee in the London Market depended. But during the short time he was in Mysore nothing was determined.

Until a few years ago Coorg Coffee never fetched the same price as that of Mysore, not even the prices obtained by the Munzerabad and Koppa Estates, and these Districts have hardly ever in their palmiest days touched the prices obtained by the high class and high grown Baba Booden Coffees. Some of the old Naduvatam Estates run the Baba Boodens very close, but even their prices are quite ten shillings per cwt. less.

Were the price solely dependent on an "Essential Oil," as Mr. Ferguson suggests, how is it that in certain years one or two places, very often young Estates (like "Faith's" sensational prices some years ago) fetch extraordinary prices and for ever after take a back seat? The soil cannot have been depleted of some constituent by one or two crops, nor can the plants and seed have lost the power of retaining an essential oil in so short a time.

In my humble opinion we must look for some other reason for the phenomenal high prices obtained by certain marks. The Estates that have for many years fetched the highest prices for East Indian Coffees, are those having a very large percentage of old Mysore Coffee plants, or what has been called the "Chick" variety, in contradistinction to the "Coorg" variety. These Estates are nearly (if not all) over 50 years old, and are situated on the "Baba Booden" Hills or spurs of the "Baba Boodens." These plants cannot have a monopoly or retained the power of extracting and depositing an "Essential oil" in their seed, thereby obtaining the high prices this Coffee has always commanded, and there are other Estates equally well cultivated and under similar conditions on the Baba Boodens with old Mysore coffee that do not fetch these top prices. There must be some other reason for these high prices, and an enquiry into the matter and discussion in your valuable and interesting Journal would be of the greatest interest and value to the common or garden planter.

To any one acquainted with the various Coffee Districts of Mysore, particular knowledge of which I am sorry I cannot lay claim, there is no apparent difference between the class and quality of soil or forest, between the Baba Boodens and the Kalasa or Merthi range of hills. Both appear to be of volcanic origin, the altitude is more or less the same, but the Kalasa Hills, lying as they do quite near the Western Ghats, get a very much higher rainfall, perhaps double the quantity gauged on Baba Boodens, and about half the price for their coffee. Then again the Estates on the Baba Boodens vary immensely in the appearance and quality of their soils and rocks. The properties shipping coffee under the mark of "Cannon M" situated on the W. & S.-W. end of the Baba Boodens have a sandy loam of

a gray colour, with Felspathic rock (similar to Munzerabad soils) very little of which can be called original forest, but chiefly of "Kumeried" land, planted up with secondary shade, chiefly of "Ficus" of sorts, the shade being kept quite dense and affording a thick annual deposit of leaf, rainfall of about 80 inches, altitude about 4,000 feet.

The Estates on the Eastern end of the Baba Boodens, shipping under the marks of "H. C. S." "Kulhuty W. D." &c. are a deep red volcanic soil, very friable in parts and much impregnated with iron and having iron-stone and ironstone boulders and masses of rock all over the land. The forest is magnificent and what would be known as original "Ghaut Forest," with splendid tall straight timber trees. The rainfall is more or less the same as "Cannon M" and about as evenly distributed. The altitude is 200 ft. to 300 ft. higher. It must be more than a coincidence that these Baba Booden places fetch such high prices for their Coffees as they do, differing so much in soil and forest. If it were dependent on an "Essential Oil," one would be led to believe that similar soil and forest would produce a similar result and similar coffee, fetching a high price. But "Morthi" Estates don't get "Baba Booden", prices for their coffee, and the sandy loams of Muzerabad do not produce "Cannon M" coffee or anything like the prices. And I cannot think the Curer is able to extract all the "Essential Oil" from Coorg and Munzerabad coffee and leave it in the others. Therefore I think we must look elsewhere and for other causes for the great variation of price.

The soil, forest and altitude being more or less the same, the only condition over which man has no control is rainfall. It is certain that the Ghaut Estates and those with a rainfall of over 100 inches do not now get the same prices as those with a smaller rainfall. And the Estates getting the high prices are those that lie to the East of a certain, or uncertain and irregular, line. Cultivation and the use of manures and fertilisers may and ought to, one would think, have a very large influence on the quality of the produce. There is no doubt that within the last few years the increased and more regular use of manures and fertilisers has considerably increased the quantity of coffee per acre. But planters *all* as a rule use the same manures and fertilisers, so that cannot be the reason of the prices obtained by the older marks. An old and more or less experienced planter attributes the high prices to a combination of old Mysore Coffee grown on the "Baba Boodens" and everything points to there being some virtue or attraction for the buyer in the old Mysore bean—that the Coorg variety does not possess. There is one exception to the above of a highly manured well worked and cared for Estate on the Baba Boodens with very old and fine looking Mysore trees, that does not now command the high prices of the others, or that it once did. There are also one or two places in Munzerabad, "Green's Igoor" and "Sanderson's Canajoro" (there may be others) that still have quite a lot of old Mysore Coffee, and "Igoor" must be very ancient and once fetched the highest price for Mysore Coffee, but these Estates don't seem to get any prices now-a-days.

Of late years, since the enormous production and great competition of Brazil has brought down the prices of East Indian Coffees, Planters have made great strides in cheaper methods of cultivation, and the use of more scientifically prepared manures, with proportionate increase of output, but no effort seems to have been directed towards elucidating the problem of the great variation in prices of E. I. Coffees.

Some steps have been taken to try and obtain lower rates from the Curers, but nothing seems to have been done to ascertain if the parching of the parchment on the Coast barbecues, the heat (and extraction of oil)

generated during the peeling and the subsequent storing on boardship does in any way affect the fugitive colour or delicate aroma of our coffees. There must be a great deal dependent on the treatment or maltreatment of the Coffee after it leaves the Estate on which the ultimate prices depend.

But after everything is done to it in India—it is the London Market that decides the price—and it seems as if it is there we should look for the reason of the great variations in price. For years certain marks, "H. C. S." "Kulhutti W. D.," "Cannon," "P. H. & Co.," "O' S K" and one or two others, have had the monopoly of high prices, almost double of that obtained by the generality of other marks. None of these Estates are remarkable for a system of very high cultivation, but year after year they have fetched phenomenal and to other planters extraordinarily inexplicable prices. This year the London Market has discovered that there is no great virtue in these well known brands and the Coffees have sold at quite ordinary rates, and many of the hitherto comparatively low priced Coffees, such as "Barguai," "Datypur," "Mockett" "Belgode" have got as good and in many cases higher prices than *the* brands.

Practically nothing has been altered or changed in management, cultivation, manuring or curing, nor has anything abnormal happened in the way of season or rainfall, yet the London Market hurls the old goods from their pedestals and sets up others.

And I think it is in the London Market we should look for the reasons of these variations in prices.

Coffee cannot surely fall back so much in quality on so many Estates and improve on so many others in one season. We do not complain, however we may envy and desire the monopoly of high prices by certain marks, but we cannot cease from wondering at the inexplicable reason of it.

The London Market having discovered there is no particular virtue or quality in certain marks and that other marks are equally valuable and desirable, the fortunate representatives should do everything they know to keep the London Market in this belief (and they might let us know how it is done) and it behoves the others who have this season taken a back seat to buck up and get back their lost reputation and position. It is not a lowering of prices we desire, but a general levelling up of prices, so that Mysore should get up again into its old position as producer of the finest Coffee in the World.

"TRIAGE".

THE COFFEE TRADE.

Brazilian holders are trying to raise their limits to correspond with the rise in exchange, but with not much chance of success, as the business passing is quite of a minor description, while there is a divergence between European values and cost and freight quotations. No improvement is expected until the exchange question is settled and receipts are much larger. With regard to mild coffee the demand for some time has been very slack, and prices have undergone decided depreciation for the lower qualities, of which the bulk of the supply has consisted. The export trades has also been disappointing, and has had a depressing influence upon the market. There has been a good demand for fine bold colory sorts when available at full rates, but undesirable parcels are difficult to sell even at the reduction. Most of the crops have already been disposed of, and little further good quality is anticipated.—*The Grocer*, July 9, 1910.

RUBBER.

Three Varieties of Castilloa.

Mr. Frederick W. DeValda writes from the Panama Canal Zone to the *Journal of the Jamaica Agricultural Society* a paper in the course of which he states:—

As it happens, I have just concluded a series of enquiries and searches to get at the bottom of the Castilloa mystery and I can briefly give you the following information:

There are in this country (more particularly in Darien, the home of the Castilloa), three distinct varieties:

Until I get replies from Kew, I can only give you the native names: (1) Borosso; (2) Leche gorda or "Plo-plo;" (3) Caucho Jobo. To discuss them in turn:

(1) *Borosso*.—This is by far the most plentiful tree; outwardly it can be distinguished by its large leaves, dark grey-black blotches on the whitish trunk, and lastly and most positively, by the following practical test:—A deep incision (tapping cut) made in this tree fills once, or rarely twice, with thick white cream.

This tree is a poor yielder; an annual yield of six to eight ounces from a mature—six to eight years old—tree being considered satisfactory. The quality of rubber then obtained is excellent.

Note.—The size of leaves is no reliable test; this varies with age of tree, soil, and altitude.

The second variety: (2) *Leche gorda* (Thick or fat milk), resembles *Borosso* in general appearance. The dark blotches above described are, however, wanting. The bark has yellowish stains and leaves are smaller.

Positive test.—An incision made fills five to six times with rich yellowish cream.

This tree has, in this country, been greatly reduced by the practice of the native tapper of cutting down the whole tree to save time and work in tapping. Its yield is very good; mature trees yielding about three pounds on the average, per annum, of excellent rubber in three tapplings. This, in my opinion, is the variety of Castilloa which, before all others, should be selected.

Lastly we come to the (3) *Caucho Jobo*. This tree is practically extinct, having been cut out by the early tappers on account of the ease of tapping it.

It has a thick, rough bark, studded with warty knobs, in general not unlike the Wild Plum tree. Its laticiferous system is very peculiar, in so much as the latex is stored in long tubes of an internal diameter of $2\frac{1}{2}$ mm., which run vertically. One horizontal incision drains the milk out of the entire area above which may be intersected by these tubes. This milk runs freely and gives excellent rubber (six pounds per annum). The tree is the one which, in my opinion, has given excuse for the many contradictory and unsubstantiated accounts of the yield of the Castilloa tree.

General and summary.—All three varieties yield good rubber. I have latterly succeeded in demonstrating the value of Castilloa rubber, when reports from the New York market shewed carefully prepared Castilloa rubber to be of the same value as fine Pará. All depends, of course, on the preparation.

SELECTED CUTTINGS.

Changes in the Soil and its Fertility.

The attention of agriculturists is being drawn continually to the fact that the soil is in a state of constant change. Formerly, the ideas concerning this change were restricted to the more obvious sources of loss or gain in available plant food, and these were attributed to purely physical or chemical causes, brought about by natural means, alone. This is no longer the case. Full recognition is being attained of the great importance and extent of the action of living organisms in the soil, and there is no longer the general opinion that the operation of manuring the soil results simply in the addition of plant food in a more or less available condition. The consequence of these matters seems to justify their review in the form of summary.

The conditions which surround any given portion of soil will, first of all, determine if it is to continue to exist as such. Where the 'wash' from rainstorms, especially on hillsides, will probably be great, the loss is lessened by the construction of contour drains. Plants possessing strong, binding roots are also used for the same purpose, and have been found especially useful where the soil is likely to be blown away by wind. The conservation of the soil by means of plants has, however, a far wider importance than this. It is a subject which requires due recognition when the reforestation of a district or country is being considered. It was the want of knowledge of this that led to the destruction of forests that has taken place in some parts of the world, in the past, and which has caused all the evils that have arisen from such destruction.

The importance of the changes in the water content of the soil is evident. These are likely to be of greater proportionate magnitude than any of the others, and are of special consequence to the agriculturist because of the necessity of water to the plant. It suffices to draw attention to the progress that has been made in the development of tillage methods that are designed to conserve the water that the soil contains, for the uses of plants—methods that have turned semi-arid regions into districts of large agricultural usefulness. Next to water, the most potent factor in influencing soil fertility is the content of nitrogen. This fact is well brought out in a recent paper (*The Journal of the Board of Agriculture*, Vol. XVII, p. 114) by A. D. Hall, M.A., F.R.S., Director of the Rothamsted Experiment Station, which, although it deals with conditions in a country situated in temperate latitudes, is worthy of special attention. . . . One of the chief conclusions reached, in this paper, is that where no special provision is made for bringing manure on to the farm, or for increasing the nitrogen content of the soil by other means, the fertility of the soil rapidly decreases until a state of equilibrium is reached, in which the losses of nitrogen are so far balanced by the gains from bacterial activity that the soil attains a level of productivity which, though lower than it was originally, remains practically constant.

Under natural conditions, the amount of phosphates in the soil is increased by the weathering of mineral particles and of the underlying rocks. It is decreased by the removal of plants and, to a certain extent, in drainage water. In cultivated soils, this decrease is likely to be larger, because of the special removal of crops, as harvest. There is, however, another cause of the loss of phosphates, to which perhaps, sufficient attention has not been given in the past. This is the application of large quantities of manure; though the exact manner of this is not yet understood. There is, therefore, a necessity, when it is designed to subject land to heavy dressings of manure, to consider the possible effect on the phosphate content of the soil.

Potash is added to, and taken away from, the soil in much the same ways as the phosphates; it is, however, likely to be lost to a greater degree in the drainage water. Experiments have shown that, when the extent to which potash salts are to be added, as manure is being considered, allowance must be made for the influence of phosphates on the potash compounds already existing in the soil. Soluble phosphates have been found to make these compounds soluble, and therefore more available for the use of plants. This effect has been proved to be increased by small applications of lime, on account of the liberation of potash brought about by it; lime in large amounts, however, has the opposite effect, in that it renders the phosphates insoluble, and therefore able no longer to act on the potash compounds.

The amount of lime in the soil is also subject to fluctuations, though these are not likely to be as great as those of the constituents that have been dealt with already. The importance of this substance may be summed up in its effect in preserving a good state of tilth, its use in preventing acidity, and the changes that it produces, in conjunction with other manures. The loss of this constituent from the soil is increased by the use of sulphate of ammonia; it is decreased when pen manure or nitrate of soda is employed.

There is now left the examination of the conditions for the best existence of those living inhabitants of the soil which produce beneficial changes in it. Acidity and alkalinity have a great influence in determining what, among these, shall continue to exist and show the greatest effect. In a soil which is alkaline to the ordinary extent, the changes are such as lead to increased fertility; in acid soils, as is well known, changes take place which result in a decrease of productiveness, and the medium becomes unfitted for the support of plants. Among the chief causes which tend to increase this acidity are insufficient drainage, together with the presence of large amount of organic matter, and the too great employment of ammonium sulphate as a manure. Acidity is a condition that is most likely to arise in heavy soils containing little lime.

It is a comparatively rare circumstance, however, that cultivated soils are allowed to become so acid as to prevent them from bearing adequate crops. The conditions for the reduction in numbers of the favourable organisms are far oftener allowed to come into existence on account of insufficient tillage, or even because of the careless application of manures. The extent to which such organisms are present, in comparison with that of the harmful ones, is dependent upon the state of tilth, or texture, of the soil, so that a sufficient argument is provided for the exercise of thorough cultivation. The same consideration shows the necessity for care and caution in applying manures, at any rate to soils containing little lime. Nitrate of soda reduces the condition of such soils by becoming converted into carbonate of soda which lowers the power of the clay particles to form floccules. The remedy for this is the use of superphosphate; a preventive measure is to apply some of the nitrogen in the form of sulphate of ammonia by mixing this with the nitrate of soda. Common salt and potash manures also cause injury to the tilth, because they increase the alkalinity of the soil through the influence of the lime in it. To prevent this occurrence, where it is necessary, these manures should be accompanied by superphosphate.

The broad, practical interpretation of these facts is that a properly treated soil will remain productive and if, as is generally the case, it is expedient to increase its productivity by the use of artificial manures, the kinds and quantities of these must be decided by considerations of the extent to which their use will be profitable, and of the effects that they are likely to produce, in relation to the texture of the soil.—*Agricultural News.*

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The Miniature Exhibition.

Owing to pressure of matter last week it was impossible to state in the brief notice of the Miniature Exhibition held in connection with the Annual Meeting, 1910, that Mr. J. A. Richardson, then Chairman of the Association, must be mentioned as the originator of this first number of a series of Exhibitions that will, it is hoped, proved to be hardy annuals, gaining in magnitude and attractiveness from year to year. The suggestion was, unfortunately, put forward too late to be acted upon as fully as was desirable, and it was quite impossible to prepare a catalogue or, indeed, to arrange the exhibits in other than a somewhat casual way. Benches, &c., had to be borrowed for the occasion, at the last moment, and but for the energetic assistance of the Scientific Officer the word "success" could hardly have been applicable in reference to the show. However, a fair number of planters, some ladies, and a few people from among the non-planting public were attracted to the U. P. A. S. I. office, and a good deal of interest was manifested.

Authority has been received for making over some of the Rubber samples to the Economic Botanist and Curator of Government Gardens, Mysore, for display at the Mysore Industrial Exhibition this year, and subsequently at the Mysore Museum. It is hoped that all planters whose specimens are still here will allow them to be handed over to Mr. G. H. Krumbiegel in this way. No formal permission is required; in the absence of instructions to the contrary before the 5th September 1910, the Secretary will assume that the plan suggested meets with approval.

As regards future Exhibitions, it may be worth while for planters to consider the desirability of displaying their products at Mysore after they have been shown in the U. P. A. S. I. office; the exhibits to be returned to them, not placed in the Museum, after the close of the annual Industrial Exhibition at Mysore.

A Register of Planters' Addresses.

It is suggested by the present Chairman that a complete register should be kept at *The Planters' Chronicle* office—for the use of planters and the U. P. A. S. I. staff *only*—of the address of every planter who is a member of a District Planters' Association. There have been occasions in the past when the Chairman, the Scientific Officer, or the Secretary has wished to clear up some doubt about a name or an address, and in this way experience has demonstrated that a complete register would be useful. For notice of subsequent changes of address the office would, of course, be dependent on the kindness of planters individually and of Honorary Secre-

taries of District Associations. In the first place, however, an appeal is made to *every* recipient of the paper (whether a planter or not) to kindly fill in and return the postcard inclosed in this number, so that his exact address may be noted.

It would be a very great help to the Editor if, later, every recipient would notify him, direct, of any change of address or of discontinuance of membership of a District Planters' Association.

It is discouraging when papers addressed in the usual way begin, after a time, to come back through the Dead Letter Office; more especially when the addressee is in Europe and many numbers must have been despatched to no purpose before one comes back.

The International Rubber Exhibition, 1911.

At the last Annual Meeting a Committee was appointed to arrange about a display of South Indian Rubber at the above Exhibition, and Mr. J. A. Richardson was selected as delegate.

The Committee have decided to invite the following gentlemen to serve on a special Home Committee, with Mr. Richardson, when he is in England, as Chairman:—

Mr. G. L. Acworth,

„ H. M. Knight,

„ H. P. Hodgson,

„ J. C. Sanderson,

„ Arthur C. Lampard,

A representative of Messrs. Rowe, White & Co., Ltd., London,

Mr. Henry Smail,

Mr. D. J. Macfarlane, of Messrs. Leslie & Anderson, London,

with power on the part of Mr. Richardson to add to their number.

Messrs. Rowe, White & Co., Ltd., of 4 Lloyd's Arms, E. C., have been asked to undertake the work of securing space and making all necessary arrangements in London, and it has been suggested that they should secure the help of a special man to work out details.

The cost is estimated at not less than £500, and it is considered eminently desirable to make the South India show both representative and imposing.

Donations are solicited from individual planters, planting companies, and all persons, firms, &c., interested in the development of the rubber-producing industry.

Managers of estates are requested to kindly arrange with the Honorary Secretary of their District Planters' Association about the supply of Exhibits, and to note that no more than 5 lbs. of each description is required from any one estate.

Contributions of literary matter *and photographs* relating to the rubber industry are also wanted, as it is proposed to publish a comprehensive booklet giving, for the information of rubber manufacturers and the general public, information concerning rubber cultivation in South India.

The idea is to have one "South India Rubber" show, divided into sections, each representing one or more planting districts.

A West Coast firm, to be chosen hereafter, will be asked to receive and forward all exhibits, but exhibitors should kindly give all necessary details as to samples sent, so that these may be labelled correctly and effectively.

Other details will be worked out from time to time, and it is hoped that any planter who has what he considers a useful suggestion to offer will not hesitate to communicate with the U. P. A. S. I.

Notes and Comments by the Scientific Officer.

63. *Manihot Rubber Varieties*.—As recorded in *The Planter's Chronicle* (Vol. V, No. 30, p. 383) the Hon'ble Mr. J. G. Hamilton showed at the exhibition in connection with the Annual Meeting of the U.P.A.S.I., a series of leaves of different species of *Manihot Rubber*, and an interesting point of identity was cleared up. Ceará Rubber (*Manihot Glaziovii*) is well known and needs no description: Dr. Ule, who discovered the others, gives the following descriptions of them:—

M. dichotoma.—Branching in pairs of branches, in thickly clustered heads. Leaves 3 or 5 lobed, divisions lyre shaped at the top in older individuals. Seeds large elongated.

M. heptaphylla.—Branches in twos and threes, spreading. Leaf stalks when young purple. Leaves 7 lobed. Fruits rounded, seeds round and like Ceará but paler.

M. piuihyensis.—Like the last, but leaves 5 lobed. Fruits angular, seeds hardly to be distinguished from the last.

From this it will be seen that *M. dichotoma* is quite distinct and easily recognised, and the leaves exhibited showed this very plainly, but the other two species are very much alike, and the specimens exhibited by Mr. Hamilton showed in both cases leaves varying from 5 to 7 lobes, and a habit in some instances low and densely branched, and in others tall and straight. The fruits, however, are distinctive. *M. heptaphylla* has a fruit approximating to a sphere in shape with six faintly defined ridges on its surface, while *M. piuihyensis* has an angular shaped fruit with six well defined sharp ridges on it meeting at a common centre at the apex.

Hence it would appear that these two species cannot be distinguished by their branching and habit of growth alone, but are best distinguished by the shape of their fruit.

64. *Fertilisers for young Rubber*.—If it is considered necessary to manure young rubber care should be taken not to apply too much Nitrogen. Rubber is usually planted on forest land newly cleared which contains a large amount of organic matter, and an overdose of Nitrogen is apt to make the trees grow rapidly in height, forming 'fishing rods' which bend over at the top and easily break, instead of making girth.

Probably the best mixture to use for young rubber up to the tapping stage on such soils is one of Basic Slag and Sulphate of Potash in the proportions 15 to 7, at the rate of about half a pound per tree, lightly worked in over the roots after the monsoon is over.

Unless the soil is known to be deficient in Nitrogen, this element need not be added, especially if green dressings are grown. When the trees are being tapped, a different system of manuring will possibly be required, and experiments will be needed to discover the best one, and also what effect different fertilisers may have upon the yield of latex.

65. *Local Names of Leguminous Plants*.—A list of the Leguminous Plants exhibited during the Annual Meeting of the U. P. A. S. I. will be found on page 384 of the *Planters' Chronicle*, and I shall be very glad to receive the local vernacular names of any of these, as I am anxious to make as complete a list as possible of the local names of plants suitable for green dressings.

During the Meeting I was informed that *Indigofera tinctoria*, which is under field trial as a green dressing for Coffee in Coorg, is known in that district as *Nel Agalu*.

RUDOLPH D. ANSTEAD,
Planting Expert.

ROYAL BOTANIC GARDENS, CEYLON.

Points from the Annual Report.

The Report of the Acting Director for 1909 contains very much that is of interest to planters in Southern India. The Acting Director calls attention to the fact that agricultural machinery and cultivating tools of modern construction are finding increased use on level Rubber estates, and that "mechanical means of clearing land are beginning to attract the attention of those about to open new plantations." We annually hear a great deal about our labour problems, and the increased difficulty of obtaining coolies, and such labour-saving devices have a significant bearing upon this problem, and they should be watched carefully by those planters who have reason to fear the increased cost of estate labour in India.

In the Scientific Division, little but routine work has been possible for the Acting Director, but we are promised during this year the publication of the results of a series of experiments in Rubber Tapping which have been conducted in collaboration with the Government Chemist.

Experiments are being conducted at Peradeniya with *Maniçoba* Rubbers, and with regard to these the Acting Director writes :—

"It would be advisable to proceed with caution, and to await the publication of reliable figures as regards the yield at Peradeniya before planting out these new species on a large scale. *Manihot dichotoma*, Jeque *Maniçoba* rubber,—the only species which has been under observation for more than a year—appears to be peculiarly susceptible to injury by wind. The three branches into which the main stem usually divides are very easily torn off at their point of attachment, and a large percentage of trees planted at a distance of 12 ft. by 12 ft. have been destroyed in this manner. Close planting (6 ft. by 6 ft.) gives protection from wind, but it remains to be discovered whether a satisfactory yield can be obtained in Ceylon by this or any other method."

Difficulty has been found in germinating the seed of these varieties, but it has been discovered that in the case of *Manihot dichotoma*, "seed from ten-month old trees germinated more readily than seed from two-year old trees," so it may be that when our existing trees come into bearing we shall be able to raise plants more readily. This is the case with Ceará : imported seed germinates slowly, while in the plantations young plants spring up beneath the trees like weeds, and seed taken from the trees germinates rapidly.

The Report is followed by a number of Supplements containing the reports of the various members of the Scientific Staff, and these are full of interesting matter, from which the following items among many others are picked out as being particularly interesting to us in South India.

Tea.—The Green Bug (*Lecanium viride*), which does so much damage to our Coffee, has begun to attack Tea in one district in Ceylon. The Entomologist writes :—"This scale-bug, once so notorious as a coffee-pest, has, since the abandonment of coffee cultivation, occurred only casually upon orange trees and various cultivated and wild shrubs, and has hitherto shown but little inclination to infest the tea plant. But during the past two years reports have been coming in showing that green-bug must now be reckoned as a serious tea pest, though its occurrence (as such) is at present confined to the afore-mentioned district. I cannot at present account for this restriction to a single locality. The bug itself was equally prevalent

throughout the whole of the coffee districts, and is still widely and generally distributed throughout the Island. There is apparently no reason why it should not equally accustom itself to a diet of tea in other districts,

Where the pest has already established itself, the prompt destruction of prunings by fire should be rigidly enforced. The pruned bushes should then be sprayed with kerosine emulsion, or with one of the recognised soapy insecticides. If it is necessary to treat bushes that are flushing, a kerosine spray will be unsuitable. In such cases a simple solution of soap may be employed to check the pest until the next period of pruning. As a precaution in other districts it will be advisable to cut out and burn any uncultivated bushes that may be found to be infested by the bug."

A number of fungoid diseases of Tea have been investigated by the Mycologist, and it is mentioned that two different fungi which cause Stump Rot have been proved to originate on old *Albizzia* stumps, a point it will be well for Indian Tea planters to make a note of.

Rubber.—Hevea rubber is not as a rule attacked by insects of any kind, for which we should be duly thankful. The Entomologist reports of it, "The Hevea rubber tree continues to prove itself practically immune to insect attack. A few caterpillars have been found feeding upon the foliage, but no serious defoliation from such causes has been reported. Many supposed cases of attack by small boring beetles have been sent in for investigation; but in every instance it has been clearly demonstrated that the insects had merely followed disease originated by one of the several fungi that are known to attack this tree, and that they were breeding solely in the diseased tissues. As I have frequently pointed out, it is practically impossible for a boring insect to obtain entrance through the bark of a healthy tree. Before reaching the wood it must penetrate the laticiferous area, and in attempting to do so it is immediately engulfed in the flow of viscid latex. Diseased patches and exposed sections of wood are always liable to attack. The latter may be protected by a coating of coal tar. Instances have been brought to my notice in which latex has exuded from galleries actually piercing the bark, and this fact has been adduced as a proof that the supposed immunity is fallacious. But such occurrences are easily accounted for. Investigation has shown that the formation of latex may be temporarily interrupted in tissues (apparently healthy but really invaded by mycelium) immediately bordering upon a diseased area. During this unprotected period entrance is safely effected; but should a wet period ensue, the suddenly increased turgidity of the laticiferous vessels results in renewed activity in the tissues that have not been completely destroyed by the invading fungus."

The Mycologist has a good deal to say about fungoid diseases of Rubber, and during the year circulars were issued dealing with *Pink Disease* and *Die Back* in detail, and these have been quoted at length in the *Planters' Chronicle* (Vol. V, pp. 174, 176).

Tapping experiments have been conducted with Ceará Rubber by the Government Chemist, and he lays stress upon what has been pointed out by the Scientific Officer here several times, *viz*: the marked variation in yield, and the necessity of selection. He writes:—

"There is, however, a marked variation in yield from the trees whatever system is adopted, and the only way to make Ceará successful will be by selection and the planting of cuttings, or possibly young plants, from good yielding trees.

"It has been found advisable to peel the trees at least a fortnight before tapping, so that the new bark may harden, and internal pressure be increased. Merely cutting through the tough horizontal fibres of the outer bark permits more rapid development of the tree, but care has to be taken not to remove the whole bark of the stem at one time, otherwise some trees are liable to die. It remains to determine whether this applies at all times of the year."

Green Dressings.—The Acting Director reports, "On the Peradeniya Experiment Station special attention has been paid this year to the growth of cover crops and green manures as a means of enriching the soil and preventing soil wash, and as an alternative to clean weeding on rubber estates. Several species of leguminous green manures and shade plants have been introduced from Java for this purpose. Interest in these matters is spreading widely, and favourable reports of the use of similar methods have been received from many districts;" and the supplementary reports contain much interesting matter bearing upon this subject. Special experiments have been conducted with cover crops in Tea, about which the Government Chemist reports:—

"The main object of the green manure plots is to show how far this system of manuring with and without the aid of mineral manures can bring the bushes into a high state of efficiency and increase the yield, while retaining and improving the soil. The results of these experiments are very instructive, and in almost every instance they have been highly successful, the steady increase in yield and vigour of the bushes being most marked. The *Dadap* plot has given the best result with a yield of 1,296 lb. per acre, followed by the *Albizzia* and *Crotalaria* plots with 994 lb. and 932 lb. respectively. The yields are calculated to 2,722 bushes per acre."

Pest Act.—It is interesting to note that in Ceylon, imported plants are examined and fumigated to prevent the introduction into the country of new pests. "All imported living plants and all fruits of the Citrus family have been subjected to treatment before delivery to the consignees, and no complaints of injury or inconvenience have been reported. Cotton seed (for seed purposes as distinguished from cattle food), has been placed on the list of imports subject to treatment. This was done as a precaution against the importation of foreign cotton pests, some of which are known to hibernate inside the seeds."

The Coconut Stem-bleeding Disease has been operated against under the Pest Ordinance, and Tea Seed imported from India has also been placed under the Ordinance, which in this case acts as follows:—

"Owing to the prevalence of blister blight (*Exobasidium vexans*) on tea in India, a disease which is not known in Ceylon, it was thought advisable to take steps to prevent its introduction into this country. Tea seed from India will now be disinfected on arrival by immersion in O. 1 per cent. mercuric chloride, unless it is accompanied by a certificate stating that it is the product of a district which is not infected by blister blight. The certificate must be signed by a Scientific Officer of the Indian Tea Association or the Indian Department of Agriculture; this limitation was considered necessary in view of the rumoured irregularities attending the issue of such certificates in Ceylon. Seed which is unaccompanied by a certificate must be packed in bags."

CORRESPONDENCE.**Rubber Seed.**

PÉRIYAR RUBBER COMPANY, LTD.,

Thattakaad, August 13, 1910.

The Editor,

Planters' Chronicle, Bangalore.

Sir,—With reference to rubber seed and the Scientific Officer's remarks at the U. P. A. Meeting. My experience here alters the figures he gives largely. I find that only about one tree in every ten bears seed at even seven years of age. Last year with 6 to 8 year old trees I only averaged 33 seed per tree, i.e., 11 pods. This year I shall average about 60 seed per tree which is obtained from 10% of the trees on the acreage only, practically every tenth tree having 600 seed on it. So at 8 years of age I should estimate an acre of rubber to yield 8,000 seed, or say 25 acres to a ton of seed.

Yours faithfully,

(Sd.) H. B. KIRK.

HORTICULTURAL GAMBLING.

Sir,—The following "Press Cutting" may interest planters :—

In his "Diseases of Cultivated Plants and Trees" (Duckworth) Mr. George Massee refers to a probable cause of the prevalence of plant disease :

"Some people are fully convinced in their own mind that diseases of cultivated plants increase in number and intensity year by year. In connection with this question, it is important to remember that at the present day the majority of persons occupied in the cultivation of plants have learnt to attribute every disease to some specific cause—generally a fungus or an insect; something that can be prevented, hence a disease. In bygone times the same amount of injury was considered as a 'visitation,' or due to 'blight,' or some equally indeterminate agency, and was accepted with calm resignation, and not counted as a disease. Cultivators have yet to learn that in addition to epidemics, primarily due to insects or fungi, of which there are admittedly many, numerous diseases of considerable importance are primarily due to physiological causes—bad cultivation; that system of horticultural gambling represented by an atmosphere saturated with moisture and an abnormally high temperature, which results too often in a general breakdown of the constitution of plants subjected to such treatment. Such a constitutional weakening invites the attacks of fungi, which promptly complete, but do not originate, the calamity. Growers have not yet realised that there is a limit to the endurance of plants grown under highly abnormal conditions; and, until they do so, they will be the greatest sufferers, as preventive measures under such conditions are, I believe, impossible."

H.

From North Formosa 18,000,000 lbs. of Oolong and 5,500,000 lbs. of Pouching were shipped during the season 1909, the former being valued at £466,997 and the latter at £153,830. With the exception of 650,000 lbs. shipped to the United Kingdom and 56,000 lbs. to Australia, the whole of the Oolong tea was exported to America. The Oolong tea export trade is entirely in the hands of three British and five American firms.

Endeavours are being made to compete with Hankow teas in Russia, to which country about 120,000 lbs. were exported.

TEA.

Indian Tea and its Rivals.

It is always interesting to note special endeavours to push the sale of the Teas of a particular country, especially when these endeavours are made on behalf of such teas generally, and not merely with reference to a particular firm's or company's, or individual dealer's brands. Apparently, there are organized efforts being made in England just now on behalf of India and China teas. In a London trade paper grocers are appealed to, on different pages, in the following terms :—

FOUR GOOD REASONS FOR STOCKING INDIAN TEAS.

1. They are most in demand. 160,000,000 lbs. of Indian Tea are consumed in a year in Great Britain.

2. They exist in great variety. There are the thick, soft teas of Cachar and Sylhet; the autumnal flavoured Doears; the pungent Assanis; the lemon-flavoured Nilgiris; the luscious Darjeelings. Every district and every palate can be suited.

3. Indian Teas deteriorate very slowly. They may be kept in stock twice as long as others without fear of spoiling.

4. The grocer is assisted by a vigorous advertising campaign, which brings the consumer to his shop.

A point that will strike the reader is that, whereas the representatives of China name a definite agency through which useful advertising matter can be obtained, the appeal in regard to India's teas is anonymous. There is nothing to show who is responsible for this; but, surely, it is a blunder on the part of India's champions?

That assistance is offered to the grocer is stated specifically, but the representatives of the China teas inform grocers to whom they should apply for such assistance, and it is just here that the advertisement on behalf of India teas fails. As regards China tea a grocer in the country can write for advertising matter, &c., to a definite address in London, whereas in the case of Indian tea is left to find out where the assistance in regard to a "vigorous advertising campaign" is to be obtained. Obviously, this is not as it ought to be. If the Indian Tea Association in London is concerned in the matter, action will probably be taken to give more point to the advertisement here quoted.

JAVA TEA IN AMERICA.

It is noteworthy, also, that Java tea is now to be systematically brought under the notice of the public of the United States. The following is taken from the seventh annual report (for the year ending April 30, 1910) of the Netherland Chamber of Commerce in America :—

"We take great pleasure in reporting an improved outlook for these

CHINA TEA.

"A country grocer, who is alert in improving his business and in meeting the competitions of the multiple shops, writes :—"I make a special point of pushing China Tea, as I recognise that therein lies the future of the tea trade for the grocer."

"China Tea is again the great attraction of all well-spread tea tables, from Royalty downwards. The leaders of the Medical profession prove that much of the evil of indigestion is due to the use of strong astringent teas.

"The China Tea Association, 98, Great Tower Street, London, E. C., is prepared to furnish leaflets, etc., to retailers who make a speciality of selling China Tea, and grants Certificates which can be displayed with good effect."

teas in the United States, and that at last an enterprising New York importing house (The Geo. F. Wiemann Co.) has started an advertising campaign in order to place this grade on the American market under its own true name.

"The Java teas originally sold in this country were of such poor quality that an unfavourable impression was created in the trade, and there still exists on that account to-day some prejudice against them. Since the improvement in the quality of the teas, which has been made during the last seven or eight years, small quantities have constantly been sold here, but they have been sold to take the place of Ceylon or India teas or blended; they have not been put before the consumer as Java teas.

"Through tests of straight Java tea, however, have revealed its excellent quality, which has constantly improved during the last years, and it was realized that where Java coffee could boast of such excellent reputation in this country, Java tea also, as well by its name as quality, ought to find favour in the public eye and taste.

"It is our sincere belief that herewith a great opportunity is opened for the planters of Java tea, and that, if this coming demand is energetically developed, in a few years the American demand for these teas will have a very marked effect on the prices which this tea may obtain in the open-market.

"In order to create a market for Java teas throughout the United States the effort to place this product before the public as such cannot be left to the resources and enterprise of one individual concern, but should deserve the attention of the combined Java tea planters.

"We may point to the history of the introduction of Ceylon tea into this country. About 15 years ago this grade was practically unknown, but the Ceylon tea planters adopted the very wise and profitable policy of advertising their tea throughout the United States, and to-day this grade has a well-established reputation and is everywhere obtainable.

"The demand for black teas in this country is increasing, especially for Ceylon. Quality alone did not accomplish this, but the Ceylon planters educated the public by their system of advertising. Java teas are similar in character and style to the Ceylon grade, and, owing to the high reputation which Java coffee possesses, it may well be asked what not could be obtained in the way of creating a demand for Java teas if a similar policy was adopted by the Java planters as one unit.

"We therefore recommend this subject to the attention of the Java tea interests, and our organization shall be pleased to aid these planters in order to bring them in contact with such individuals or concerns who are in a position to plan and execute such campaign to the best advantage."

Ceylon interests have been and Indian are still being actively pushed in the United States. Java is now following suit, and it will be interesting to see the results.

In the meantime, the need for determined endeavours to counteract the influence of campaigns conducted in the interests of the rivals of India teas will probably be apparent to all producers of tea in this country. There is no cause for alarm, but for sustained and even increasing effort there is abundant reason.

RUBBER.

Manihot Rubber Trees.

In the course of an article on this subject, *Tropical Life* remarks concerning Ceará Rubber (*Manihot glaziovii*):—

The British East African authorities consider that, once the trees are 6 ft. high and over, they need have no undue fear of a drought. The trees will not prosper, but, on the other hand, they will not die.

According to Mr. Williams [in the *Agricultural Journal of British East Africa*] their year, from a planting point of view, begins at the end of the long rains in May, when the bush is cleared off. The trees are then planted 12 ft. by 6 ft., with the idea of leaving them 12 ft. by 12 ft., the rest being "tapped to death" in two years or so. Meanwhile the seed beds have been planted, and the seedlings coaxed along to be planted between October and December, when the rains are on. In East Africa porcupines give trouble, as they dig up the tubers and eat them. In such cases a low wide-meshed wire fence is the best remedy. . . .

In German East Africa the "Lewa" system of tapping is practised, and by it we are told that Ceará trees can be profitably tapped from about the end of the second year to the tenth year continuously. The system is described as follows:—"The surface to be tapped is freely coated with the juice of sour citrus fruit, such as a lemon, lime, or sour orange. The bark is then horizontally stabbed with the point end of knife, having a thin sharp edge, at distances of about 3 inch apart. The milk immediately exudes, and quickly coagulates on the trees, when it can be collected and made into balls within an hour afterwards. Vinegar and weak carbolic acid can also be used for coagulating the rubber. If no acid is applied, it will be found that the greater part of the milk is wasted in the ground." The rubber has then to be dried thoroughly and made ready for shipment.

When vertical tapping is used, the cuts should not be less than 5 inch apart, and enough uninjured bark must be left to admit of rapid recovery, or the vital processes of growth will be interfered with.

Mr. Kelway Bamber, we think it was, mentioned a method of "pricking" that would be more reliable than the "Lewa" knife-stabs. A leather shield, the size of the area to be tapped, has nails (with sufficiently large heads to avoid their going through the leather) driven through it at such distances as it is required to make the punctures in the bark. All the nails being of the same length, protrude through the leather at equal length, and this length, of course, must be no longer than it is thought good for the hole to be made, to penetrate into the bark. The leather and nails are then laid against the tree and hammered home quickly, but with regular and even blows, with a good-sized wooden mallet. As soon as this is done, one corner of the leather is seized, the whole ripped off, so as to leave the tree neatly punctured, and the sap allowed to flow. In Ceylon it seems to coagulate on the tree, and a rubber plaster instead of the leather one is next ripped off, but perhaps elsewhere a wide V-cut can conduct the latex to a cup, best tied on to received it. The area treated in this way should not be too large, a foot square should do well, otherwise before the time the malleting is finished the latex will be out. The same apron can be driven home in several places probably, and if one below the other, the one V-cut would catch the latex for all. The outer bark in either case must, of course, be stripped off. With the "Lewa" method, rubbing with sour citrus fruit could well be tried, as the juice is a great cleanser.

Varieties of Rubber.

CREPE, SHEET, AND BISCUIT VARIETIES OF RUBBER.

Rubber reaches the home market in almost every possible shape and colour. In most cases the queer names which one reads in the market reports are fairly descriptive. Thin pale crepe, for instance, arrives in long strips, generally about 4 ft. long and 8 inch to 12 inch broad. It varies in thickness from one sixteenth to half an inch, and has a roughish surface from which the name "crepe" is derived. This rubber is pale yellow in colour, and when held up to the light it is quite transparent, which proves its purity, and accounts for the very high price obtainable for this grade.

The so-called "sheet" rubber is similar to crepe, but slightly thicker and not so transparent. It is prepared in a different manner and, unlike crepe, must be put through the washing mills by the manufacturer before it can be used.

Hard cure fine Pará is prepared by the native labourers on the Amazon by dipping a so-called "paddle" in the rubber, and then holding it in the smoke of a fire, which hardens the coating of milk on the paddle. The paddle is then dipped again for a second coating, and again smoked, and so on until quite a large "biscuit"—generally weighing about $\frac{1}{4}$ -cwt.—has been built up. The labourer then takes his knife and slits the biscuit down one side, in order to remove his paddle, when he proceeds to make his next biscuit. Rubber thus prepared contains a large proportion of moisture, but is stronger than any of the plantation rubber.

AFRICAN PRODUCTS.

From the Congo we get large supplies of clean solid black rubber, coagulated originally in large blocks and then cut up into small cubes in order to allow it to dry and ripen. We also get from the Congo rubber reddish sausages, collected directly from the tree, the reddish appearance being caused by small portions of the bark adhering.

From the Gold Coast we get rubber prepared by the natives' merely digging a trough in the earth and running in the latex, which in time coagulates from the outside and forms a hard skin and finally a fairly hard lump throughout; but this grade holds all the moisture which was originally in the latex, and as a result, when cut across, such lumps are found to contain 50 per cent. of their own weight in water.

On the Ivory Coast, the French Sudan, and in Sierra Leone neighbourhood the natives collect rubber from the same trees, but give much more pains to the preparation of it, the resulting produce being known as "Sierra Leone Niggers" or "Conakry." This rubber is in large balls, consisting of strips carefully wound together, varying in size from that of a good sized orange to that of a man's head. This rolling process is carried out when the strips of rubber are quite fresh, so that they become one compact solid ball. Rubber treated in this way is of a reddish colour, for which reason these balls are often known as "Red Niggers."

From the Niger district we get rubber varying from small balls of fine white rubber of excellent quality, known as "White Niger Niggers," down to a soft pasty substance which looks like bad honey and smells abominably.

One point in connection with the values of the different varieties is worth attention—namely, that values do not move together. Each grade may be said to be a market to itself. There is, of course, some sort of relative proportion, but nevertheless each grade practically fluctuates by itself.

SELECTED CUTTINGS.

Insect and Fungus Depredations.

There is probably no crop raised by the planter, the agriculturist, or the gardener, especially when grown on a large scale, which is not at one time or other of its existence subject to the damaging attack of some insect or fungus pest, and while it is not the object of the article to deal at all exhaustively with the matter, we propose to give instances showing the immediate necessity for action, and then to make a suggestion which we hope may be largely acted upon.

Let us take, then, as a case in point, the Pará rubber tree (*Hevea brasiliensis*) and two of its principle enemies—*Termes gestroi* (the white ant) and *Fomes semitostus*, or root disease.

T. gestroi, once looked upon by planters as useful aids—which in a sense they were, as they assisted in the final demolition of the old felled timber left, by the short-sightedness of the original clearers of the ground, to rot where it fell—have now on many estates, had their numbers multiplied many thousandfold by the facilities thus given them, turned their attention to the living trees, which, have displaced the forest timber in their possession of the soil, and now seem, liable to fall victims to the same insects which helped to give them room to grow.

The fallen timber having become more or less exhausted, forces the armies of white ants raised upon it to forage for supplies elsewhere, and it must be remembered that every tree that is felled to clear the land for planting helps to increase the trouble.

F. semitostus, more commonly known as root disease, a species of fungus is, like *T. gestroi*, due in a great measure to rotting logs.

These logs being distributed over the estate in close proximity to the rubber trees, so that no living tree is many feet distant from a mass of decaying wood, it naturally follows that the living roots must sooner or later come into contact with the dead timber, and that any fungi which are assisting to decay the incumbrance are thus speedily given the opportunity of transmitting themselves to the objects of the planter's care.

Now, root disease, like the white ant, is capable of flourishing either upon living or dead wood; like it, again, it works underground, and its insidious attacks are unsuspected until their immediate subject is past remedy, and once either pest obtains a thorough footing in a plantation it may be taken as certain, unless prompt measures be adopted to stamp it out, that the losses will be enormous and finally disastrous. Planting in the East has only just commenced—hundreds of thousands of acres have still to be cleared and planted up—and if precautions are not taken in doing so, worse trouble instead of more profit will accrue. Moreover, these troubles are likely to become more and more widespread as time goes on, and we cannot too strongly urge every planter to take steps at once to deal with any cases of attack which may appear on his plantations, and not to rest until he gets the better of them; otherwise the pest, and not the planter, will win. Therefore, as we urged at the Brussels Congress, united action must be taken, both by the planters and the scientific authorities, to see that no act of negligence should be allowed to generate disease, nor lack, either of funds or energy, prevent its eradication should disease appear.

—*Tropical Life.*

The Planters' Chronicle.

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(INCORPORATED.)

The Scientific Officer.

Mr. R. D. Anstead, B. A., left on Saturday evening, 20th instant, for Calicut *en route* to the Wynaad, whence he will proceed about the 1st September on a short visit to estates in Cochin and North Travancore.

As usual, correspondence of a private character and any that is intended to be forwarded to Mr. Anstead without delay should bear instructions on the cover.

The S. I. P. B. F.

Under the authority of the Committee, 3½% Government Paper of the face value of Rs.5,000 has been purchased with the bulk of the moneys of this Fund. Total subscriptions and donations up to the 26th instant amount to Rs.5,057-7-0.

The revised rules of the Fund will be printed and circulated at an early date.

Mr. H. P. Hodgson.

Though this gentleman is by now on his way to England, it is gratifying to be able to state that he has not severed his connection with the U.P.A.S.I. As a former Chairman, and as "Planting Member" during four successive terms of office, Mr. Hodgson has had special opportunities of studying the conditions of planting in this country and the requirements of the community of which he is a distinguished member. He has also established a claim to the gratitude of that community which has been recognised with cordiality and acknowledged publicly.

Mr. Hodgson has accepted a seat on the Home Committee to be formed in connection with the representation of South India at the International Rubber and Allied Trades Exhibition next year; and as he is also on the Exhibition Committee his services should be of great value. He has expressed also his willingness to assist the U.P.A.S.I. by seeing Sir J. D. Rees on the subject of Ceylon's Import Duty on Tea; and has stated further that he will always be glad to render any assistance in his power.

The Ginguet Rubber Machine.

A planter has asked the Secretary, U. P. A. S. I. where a description of "the Ginguet Rubber Machine invented by M. Léon Ginguet, of Lyons," can be obtained.

Can any reader kindly furnish the desired information?

"The Planters' Chronicle."

Back numbers from February to July 1909 are specially wanted, so that further copies of Vol. IV may be issued. Any planter who can spare such numbers will confer a great favour on the Editor by kindly sending them in.

Notes and Comments by the Scientific Officer.

66. *Fertility of Pollen*.—A Research Bulletin on the subject of 'Conditions which influence the Germination and Fertility of Pollen' has been issued by the University of Wisconsin. The following of many conclusions reached as a result of experiments are of interest, and have a distinct bearing upon the fertility of Coffee. It is a matter of experience that the crop is largely controlled by the nature of the 'blossom showers', over which the planter has no control, but other controllable factors affect the pollen and therefore the crop. The lack of cultivation and fertility in orchards greatly injures the production and fertility of pollen.

"Experiments indicate that the length of time required for the germination is considerably less than is commonly believed. Two or three bright, warm days, at the time of full bloom, are sufficient for the setting of the fruit. The stigmas of the apple are receptive from four to six days, whether pollinated or not. Continuous rainy weather for six days would probably result in total failure of the crop.

"The factors which affect the fertility and production of pollen, over which the orchardist has control, may be briefly stated as follows: suitable site, location and soil; proper planting, cultivation, and sufficient amount of plant food; pruning and spraying; selection of suitable varieties propagated from bearing trees; and the planting of several varieties which flower at about the same time, to insure proper fertilisation.

"The factors over which the orchardist has little or no control are: freezing temperature, which may kill the pistil or the pollen, especially before the latter is ripe, or both; continuous rain during full bloom of the orchard; high temperature with a large amount of moisture, and absence of wind, which causes much pollen to burst at the time of germination; and absence of insects and wind at the time of full bloom."

67. *Crotalaria quinquefolia*.—In May last some seed of a Leguminous plant for identification was sent to this Office. Plants have been raised and flowered from this seed, and independent specimens also received from the original correspondent, who states that it is a common plant in North Mysore, and writes of it as follows:—"I am afraid the plant is of no use as a cover plant, as it dies down early in the hot weather. The question is, is it of any use on account of the closely packed nitrogenous nodules which it has on its roots? I have seen no other Legume with such an array of nodules."

The plant proves to be *Crotalaria quinquefolia*, which I have found in South Mysore, and in Coorg, and have had sent to me from Malabar, so that it is probably very common and widely distributed. It makes a good cover while growing, and my correspondent informs me that the seed "germinated well among Coffee."

As a green dressing it should be excellent, and as it dies down in the dry weather it should be cut at the end of the rains and used as a mulch during that period.

68. *Fungus for Green Bug*.—"The theoretically ideal method of dealing with insect pests is to encourage their natural enemies, but it is of limited application, because complications invariably set in sooner or later." (*Knowledge*. Vol. 84. No. 2124). It has been suggested that the fungi which attack and destroy Green Bug (*Lecanium viride*) should be cultivated and used as a spray, but the difficulty which arises in this case is that the fungus will not grow in the dry weather, just when the Bug does so much damage.

RUDOLPH D. ANSTEAD,

Planting Expert.

PLANTERS' PAPERS.**I.—One Aspect of the Effect of Mulching on the Mechanical Condition of the Soil.**

I have been asked by our Scientific Officer to write a paper for the *Chronicle*. Naturally I feel diffident of doing so, but Mr. Anstead has been so insistent that I have effected a compromise with him and submit the following little 'Talk with Mr. Soil' asking all readers to be lenient in criticising it. This paper is not intended for those who have Hall on "The Soil" at their fingers' ends, but for those who have not had the time, or the inclination, to read up the subject.

Let us sit down and have a quiet talk with our old friend the Soil, ask him questions, and see if we cannot get him to give us some hints first hand, and not through the medium of his agent, Professor Dry-as-dust. It is not likely an old pal will refuse what we want if we approach him properly.

Let us confine ourselves to seeing what he will tell us about the effect of mulching on his mechanical condition; we have heard Mr. Longwinded and Dr. Musty-tome, let us see what Mr. Soil himself says.

How are we to put our question? We want to know how mulching affects the mechanical condition of the soil. Let us take a common flower pot, say, 1 ft. high and 1 ft. across the top, and fill it properly, and to do this we must put coarse pieces of broken tile in the bottom to about 3 inches depth, then coarse gravel on the top of that for 2 inches, and then fine gravel for say 1 inch. Then we have our flower pot half full, now let us fill it right up to within $\frac{1}{2}$ -inch of the top with good loam from virgin land. We have in a small space and handy form a miniature of a vast country. I say so because we may regard the whole land part of our sphere as a huge flower pot filled by bounteous Dame Nature for our use.

We will hand over our pot, filled as described above, to a cooly, or mali, and tell him to imagine there is a plant in it, he is credulous enough for that, and ask him to water it just as he does the other pots of plants in the garden.

"Now then Mali, water that plant."

Splash!! as he pours the water on with a thud, and then a minute or so after we see muddy water trickling out of the bottom of the pot. What has happened? The water has carried down with it millions of the very fine particles of the earth in the pot. Mr. Soil is composed of different sized particles, some coarse, some medium, some fine, and the water poured on above has carried down many of the fine particles. This goes on day by day, and after a time what happens? The earth in the pot is robbed of its most valuable part, the finer particles. I say "most valuable" advisedly, as it is from these tiny particles that the minute root hairs take up nutriment for the plant. Now, Mr. Soil, how do you like this treatment? Mr. Soil gives us his answer not in words, but still quite clearly, in the fact that plants in pots do not thrive after a course of such treatment, and so we have a reply from Mr. Soil that he resents this washing out of his finer particles. We have put our question and got a reply; let us see what we can learn from it.

I have said above, and I now reaffirm it, that our flower pot is a replica of a big tract of country. This being so, the reply we have received is applicable to such an area. Our Mali with his water pot is analogous to King Nimbus, the storm cloud, and the actual pouring of water on to the

pot is analagous to the heavy falls of rain we get in tropical countries. The action is the same in both cases, there is a washing down of fine particles, and consequent loss. How can we prevent this loss? Why, by covering Mr. Soil up, and not letting the full force of the rain fall on him; he will get all the moisture he wants, but not in so violent and injurious a way. It is like, when a man wants a drink, chucking a whisky and soda at him.

Now what can we cover him up with? Why with the leaves that fall from our shade and jungle trees when they have done their work on the tree, and, if they are not enough, we can use growing plants such as *Cassia mimosoides*, Wild Indigo or *Tephrosia*, and, failing that, old line thatch, leafy branches cut from trees growing in waste places, weeds, or any other sort of rubbish. It does not so much matter what we cover him with, but cover him we must.

This is the only aspect of mulching I am going to treat to-day. There are others of course, and very important ones, but we will not tire our friend Mr. Soil by asking him any more questions to-day, as he has given us an answer on the point we wanted information on; and so let us defer farther talk till another time.

C. K. PITTOCK.

FORMOSA TEA.

A correspondent wrote the *Japan Times* lately explaining that the grant of a subsidy to the Japan Formosa Tea Company by the authorities had its genesis in the undertaking started in 1903 at An-Ping-Ching by the Government with the object of encouraging Machine-Curing in place of the defective and expensive process of Hand-Curing which was producing only an inferior quality, and of manufacturing black tea. Both the machine-curing and black tea manufacture were an entirely novel business in Formosa, for neither native nor foreign tea dealers in that island, probably deterred by considerations of expense and risk, had ever attempted it. But the successful result realised at the Station in the experimental manufacture of black tea evidently inspired some of the tea-dealers and business men in Formosa and Japan proper with courage. At any rate, they represented to the Formosan authorities that they would like to undertake the machine-curing and black tea business, provided that the Government, in consideration of the difficulty and risk unavoidably attending the initial stage, would extend suitable aid.

In starting the experiments the Government's idea had been from the first to encourage private enterprises conducted on the same line. It had no intention to develop the experiments into a permanent undertaking of the Government, already saddled, as it was, with various monopolies. The representation submitted by those interested in the business therefore received the favourable consideration of the Government, and the upshot was that it decided to grant the request, and to guarantee an interest of 7 per cent. on the paid up capital for a period of five years and to allow a gratuitous use of the plant at the Government Station. It was under this assurance from the Government that the Japan Formosa Tea Company came into existence. The subsidy affair is still in the shape of an understanding, the amount to be granted being estimated at about 30,000 yen. It will be granted for the special object of extending the sale of Black Tea in Russia, and probably towards the expense of maintaining tea-houses to be established at some of the principal cities in that country.

CORRESPONDENCE.**Insolvency of Messrs. Arbuthnot & Co.**

Official Assignee's Office,

Madras, 18th August, 1910.

Dear Sir.—I shall be obliged if you will allow me to make use of your columns to enable me to say in reply to many enquiries that I am receiving that at present I am not able to say at what rate creditors will be paid a Third Dividend, nor can I say when I shall be able to declare it. I have been in communication with the Trustee in England and hope to hear from him shortly, when I shall be in a position to decide at what rate the dividend can be declared. So far as I can see at present, it will be a very small dividend and cannot be paid for 3 months.

(Sd.) J. R. B. BRANSON,

*Official Assignee.***Green Bug.**

Yercaud, 21st August, 1910.

Dear Sir.—I recommend the following as an improvement on my solution for brushing Green Bug. Boil $1\frac{1}{2}$ to $1\frac{3}{4}$ lbs. soap and $\frac{3}{4}$ -lbs. refined salt-petre in half a kerosine tin of water; when *boiling* add slowly, stirring it well in, $\frac{3}{4}$ -bottle (quart) Liquid Fuel. When thoroughly mixed take off the fire, fill up with cold water and mix well again.

Each cooly must mix before he takes his supply and he must mix with his brush every time he dips his brush in, otherwise brushes get full of oil and won't make a proper lather, necessitating the brushes being boiled to get rid of the excessive oil. This solution kills quicker and once dry does not wash off, it is perceptible on the trees a year after application, and I believe it keeps the bug off. With spike and very small berries the old solution is perhaps best, but at all other times I prefer the above. If there is any burning of tender foliage the saltpetre must be reduced to $\frac{1}{2}$ -lb. On the Shevaroy's the trees will stand $\frac{3}{4}$ -lb. easily, but on the Nilgiris I have to reduce to $\frac{1}{2}$ -lb. when using the Liquid Fuel; much as usual depends on the mixing and superintendence.

(Sd.) A. G. NICHOLSON.

Rinderpest.

Prospect, Naduvatam,

August 19, 1910.

Sir,—As prevention is always better than cure, may I ask you whether nothing has yet been discovered regarding the conditions which predispose cattle to rinderpest? Can we do nothing for our cattle to improve their stamina so as to enable them to resist the terrible rinderpest which periodically sweeps the Nilgiri Plateau? We have seen lately the risk that owners of cattle run who have their cattle inoculated, and therefore, I think it is time to enquire whether anything can be done to fortify our cattle against this terrible disease. Perhaps the authorities at Pusa can answer this question? Are cattle in one locality more liable to this disease than in another? and if so, why?

Yours faithfully,

(Sd.) J. J. MCKENZIE.

TEA.**Production in India.**

From a note on the Production of Tea in India in the year 1909 issued by the Commercial Intelligence Department it appears that the statistics given of area under tea are for the most part those reported by planters. In the case, however, of those plantations for which figures are not so reported estimates, which do not profess to be more than roughly approximate, are prepared by local officers. In the year under review such estimates have been made in respect of 28 gardens out of a total of 934 gardens in Eastern Bengal and Assam and in respect of 47 gardens out of a total of 210 gardens in Southern India. Including the estimated area, the total area under tea in 1908 and 1909 was divided between the different provinces as follows:—

TABLE NO. 1.—AREA IN ACRES.

	1908.	1909.
Eastern Bengal and Assam		
Brahmaputra Valley ...	210,704	212,457
Surma Valley ...	134,938	135,562
Jalpaiguri (including Alipur Dura) ...	83,365	85,496
Chittagong ...	4,283	4,289
Total, Eastern Bengal and Assam ...	433,290	437,804
Bengal—		
Darjeeling ...	51,614	51,220
Chota Nagpur ...	2,291	2,249
Total, Bengal ...	53,905	53,069
United Provinces	8,086	8,066
Punjab ...	9,393	9,376
Total, Northern India ...	17,479	17,442
Madras	14,626	15,723
Travancore ...	27,103	29,174
Total, Southern India ...	41,729	44,897
Burma ...	1,724	1,693
Grand Total ...	548,127	555,305

Out of the total area of 555,305 acres for which either returns or complete estimates have been received, 520,642 acres were reported to have been plucked during the year. On the remaining 34,663 acres, the plants were either too young to be plucked or were not plucked for other reasons.

The total number of plantations was 5,890 in 1909, as against 5,885 returned in 1908—a net increase of 5 plantations. The increase hardly calls for comment.

In Eastern Bengal and Assam, 934 plantations are reported to have a total area of 437,804 acres under tea, an average of 469 acres. In Bengal, 304 acres is the average of 176 plantations and in Travancore, 379 acres of 77 plantations. In Madras and the United Provinces the average is much smaller, being about 118 acres in the former and 110 acres in the latter. In the Panjab, where tea cultivation is conducted on a small scale, the average area is only 3 acres. In Burma, tea plants are grown in small scattered patches which measure approximately one acre each on the average. The figures relate only to tea-bearing areas and do not include the area in the occupation of planters but not under tea cultivation.

PRODUCTION.

[The production of tea in each year since 1885 is given in an Appendix which is not reprinted here.] It is noticeable that while the area under cultivation has increased since 1885 by 95 per cent., the increase in production has been one of 267 per cent. The following statement shows the actual increase or decrease in acres and pounds of the area and production

in each year from 1886 as compared with the figures of the preceding year and also the ratio of the area and production of each year to the year 1885 which is taken as the base year :—

The total production in 1909 has been reported at 262,668 lbs. divided between the different parts of India as follows :—

	Assam.	Eastern Bengal.	Bengal.	Northern India.	Southern India.	Total.
1907 ...	164,194,327	46,713,114	13,503,444	3,532,139	16,219,906	244,162,930
1908 ...	166,456,859	44,978,057	14,993,590	3,447,365	17,030,208	246,906,079
1909 ...	174,851,202	52,243,938	13,165,788	3,620,331	18,679,409	262,560,668

Burma is excluded from these calculations for the reason that the produce of the Burma tea gardens is almost wholly converted into *letpet* (wet pickled tea), which is eaten as a condiment. In 1909, 242,045 lbs. of *letpet* were manufactured and only 4,230 lbs. of leaf tea (black).

The production of manufactured tea (green and black) per acre plucked during 1909 works out as follows :—

	Lbs.		lbs.
Jalpaiguri	624	Chittagong	353
Lakhimpur	592	Coimbatore	342
Cachar	559	Goalpara	306
Travancore	543	Kamrup	266
Syhet	538	Darjeeling	256
Darrang	534	Chittagong Hill Tracts	208
Malabar	533	Kangra	152
Sibsagar	477	Almora	124
Nowgong	450	Ranchi	121
Dehra Dun	369	Hazaribagh	89
Nilgiris	368	Garhwal	66

PRODUCTION OF GREEN TEA.

Reported Production.

	1907. lbs.	1908. lbs.	1909. lbs.
Surma Valley	... 1,276,589	962,166	895,583
Other parts of Assam, Eastern Bengal and Bengal	... 733,018	883,245	271,563
Total Eastern Bengal and Assam and Bengal	... 2,009,607	1,845,411	1,166,946
Northern India	... 1,120,653	1,074,760	1,251,105
Southern India	... 399,000	106,950	259,942
Total Reported Production	... 3,529,260	3,027,121	2,677,993

EXPORTS.

	1907-08. lbs.	1908-09. lbs.	1909-10. lbs.
From Calcutta and Chittagong	... 833,287	754,186	313,126
By land and from Sind by sea	... 857,709	677,324	762,048
From Madras by sea	... 79,761	...	...
Total Exports	... 1,770,757	1,432,010	1,075,174

No bounties were paid on green tea for the season 1909-10, the allotment by the Cess Committee in that connection being discontinued after 31st March 1909.

EXPORTS.

[A Table shows the quantity (in lbs.) of Indian tea exported direct to each country during the last five years.] The destinations given are those declared on export, and, owing to the use of optional Bills of Lading, it must be assumed that the true quantities differed in some cases from those stated. The result is that the figures of export from India do not agree with the figures of import into various countries, *e.g.*, the United Kingdom. But the discrepancies tend to balance one another in a series of years.

The most striking features of this year's trade are as follows. Exports by sea increased by 15,441,458 lbs. as compared with 1908-09. Direct

shipments to the United Kingdom increased by over 12 million lbs. Direct exports to Russia decreased by over 8 million lbs. or some 44 per cent.; those to Germany expanded by some 1,119,000 lbs., while shipments to Austria-Hungary fell off by some 164,000 lbs. or 87 per cent. The exports to Denmark, Sweden, Holland and Belgium also declined considerably; but Norway, Italy, France, Roumania and Turkey (European) took larger quantities. Some 600,000 lbs. less were exported to Egypt, while Canada's import declined by some 200,000 lbs. The United States took some 400,000 lbs. more. China increased her imports by about 1,376,000 lbs. and Ceylon by 11,302,000 lbs. The shipments to Australia and New Zealand contracted by nearly 392,000 lbs.

In order to obtain a true account of the ultimate destination of Indian tea it is necessary to take into consideration re-exports of Indian tea from the United Kingdom. These are shown in a statement. The total re-exports increased by some 6 million lbs., Russia taking 3½ million lbs. and the United States of America nearly 1½ million lbs. more than in 1908.

During the five years 1903-04—1907-08 the percentage of the Indian tea crop sent to the United Kingdom steadily diminished; but there was a slight recovery in 1908-09 and the improvement was sustained in 1909-10. On the other hand, direct exports to other countries in Europe, which have improved from year to year during the same period, received a set-back in 1909-10. A feature of the year's trade is the considerable advance in shipments to Asiatic countries such as Ceylon, China, and Straits Settlements.

The quantities of each kind of tea entered for home consumption in the United Kingdom in each of the last five years and the consumption per head of the population were as follows:—

	CONSUMPTION PER HEAD.					
	Indian tea.	Ceylon tea.	China tea.	Tea of other countries.	Indian tea.	All tea.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
1905 ...	150,531,206	89,386,724	6,659,017	12,513,433	3'48	5'99
1906 ...	139,228,055	91,946,312	5,671,553	13,277,569	3'65	6'19
1907 ...	162,489,491	87,073,314	9,729,142	14,692,103	3'68	6'21
1908 ...	157,441,706	92,960,405	8,920,731	16,092,297	3'53	6'18
1909 ...	160,146,748	95,133,920	8,190,545	20,078,274	3'60	6'38

EXPORTS OF OTHER FOREIGN COUNTRIES.

The latest official figures for exports of tea of other foreign countries are as follows:—

	Japan. Exports.*	Java. Exports.	Natal. Exports.
	lbs.	lbs.	lbs.
1905 ...	37,708,343	25,795,973	...
1906 ...	39,778,193	27,517,615	2,057
1907 ...	40,564,871	29,286,402	584,299
1908 ...	35,269,069	36,579,941	276,558
1909 ...	40,664,131	36,679,003	136,495

* Mostly green tea in the United States of America.

FOREIGN TEA IN INDIA.

The imports of foreign tea into India in 1909-10 were 6·7 million lbs., nearly a million lbs. less than in 1908-09. About one-eighth was re-exported as foreign tea chiefly from Bombay to Persia, Turkey in Asia, Muscat and Bahrein Islands by sea, and by land to Afghanistan, leaving some 5½ million lbs. for consumption in India. Part of this no doubt was used for blending with Indian teas, and the blend, when exported, was perhaps treated as Indian produce in the Customs declarations.

As already explained, the reported figures of production are far from accurate, and consequently any estimate of the consumption *per capita* in India as a whole is vitiated at the outset. There are, however, reasons for thinking that internal consumption is generally increasing.

In Burma, in addition to leaf tea, about 20 million pounds of pickled tea (*letpet*), mostly imported from the North Shan States, are consumed annually. The consumption per head of population is estimated to be about 2 pounds.

PERSONS EMPLOYED IN THE INDIAN TEA INDUSTRY.

The number of persons employed in the industry in 1909 is returned at 515,950 permanently employed and 81,126 temporarily employed. Compared with the return of the previous year there is an increase of 6,462 permanent employees and of 6,407 in the number of temporary hands. In Southern India, the work is some times done by contract, and in this case no record of the labour employed is available, and the figures are therefore not complete.

CAPITAL EMPLOYED.

According to the returns of the Registrars of Indian Joint Stock Companies and the accounts of the companies registered in London as reported by the Indian Tea Association, the capital of joint stock companies engaged in the production of tea amounts to over Rs.25 crores or about £17 millions, *viz.*

		Rs.
Companies registered in India	...	3,86,80,140
" " London	£14,096,658	21,14,49,870

Particulars are available concerning the present position of 84 companies registered in India which have an aggregate paid-up capital of 263 lakhs. Of these companies, 62 companies declared dividends for 1908 amounting to 9'3 per cent. on their aggregate capital of 199 lakhs and 7'6 per cent. on the total capital of 244 lakhs in that year. Sixty-two companies have up to now declared dividends for 1909 amounting to 9'6 per cent on the aggregate capital of 198 lakhs. The total dividends so far declared for 1909 on an average amount to 7'2 per cent. on the total capital of 263 lakhs in 1909.

The value per Rs.100 of joint stock capital as calculated on the prices of the shares of 68 companies quoted in the Calcutta market was Rs.100 in march 1909 and of 69 companies was Rs.112 in March 1910.

Similarly particulars about the 69 companies registered in England with sterling capital of £10'2 millions (1,526 lakhs) are available and show that the total dividends declared in 1908 by 64 companies out of them with an aggregate capital of £8 millions (1,203 lakhs) amounted to 7'2 per cent., which means 5'8 per cent. on the total capital of £10 millions (1,488 lakhs) in that year. This year the dividends declared up to now by the 47 companies come to 3'3 per cent. on their aggregate capital of £6 millions (or 934 lakhs).

The shipments of camphor—a Government monopoly—from Formosa in 1909 were as follows:—

	lbs.
Germany	... 2 465,600
United States	... 1,908,000
France	... 1,344,900
United Kingdom	... 759,000
Other Countries	... 198,160

Total... 6,670,660

Owing to the lowering of the price of camphor, in order to drive Foochow and synthetic camphor from the market, profits from the monopoly were small.

COFFEE.**Production of Coffee in India.**

A Note on the Production of Coffee in India in the year ending 30th June, 1909, states :—

The former issues of this *Note* were prepared for the Calendar year ; but it was felt that the presentation of statistics for the calendar year was open to the objection that the calendar year did not coincide with the coffee picking season in the several provinces generally and especially in Southern India, where 99 per cent. of the crop in India is grown. The result thus was that the statistics hitherto showed part figures for two different seasons and not complete figures for one season as is naturally desirable. The Government of India have consequently decided, after consulting the Governments of the Provinces concerned in the cultivation of coffee, that the *Note* should be prepared for the year ending on the 30th June so as to show so far as possible figures for a complete coffee season. ...

It is a matter for regret that it should be necessary to preface the remarks which follow with a warning that the figures are in several directions imperfect, mainly as a result of the apathy shown by some of the planters who either sent incomplete returns or no returns at all. A notable instance of the latter kind is afforded by the Nilgiris District, where no returns were received from the planters by the provincial authorities in respect of about 40 per cent. of the area under coffee in that district. An acknowledgment is on the other hand due to those planters who have co-operated by furnishing as accurate information as possible. As in past years, the figures of area under coffee computed on the basis of planters' returns have been correlated to the figures of the Agricultural Statistics of the province which are based on the village accounts ; and the latter figures have been adopted wherever they were considerably in excess of the former. At the same time there have been no instances where the area returned by the planters has been appreciably lower than that recorded in the Agricultural Statistics. It remains to be added that, where the Agricultural Statistics figures have been adopted, an estimate of production has been made for the excess area in the light of the information furnished for the rest of the area corrected by the results of inquiries made by local officers ; of course, the estimate can only be regarded as roughly approximate. The estimates of the yield are generally so very far wrong in all the provinces and states that no adjustment of the details is possible, but the total production can be corrected by the total of the exports from India which is entered for each year in the last column of the abstract table . . . In this respect the estimate of the outturn in the year under review and the preceding year seems to be entitled to a superior degree of reliance as contrasted generally with previous years' estimates.

AREA.

The coffee industry of India is practically confined to Southern India. Coffee is grown also in Burma, Assam, and Bombay ; but the production of these provinces has assumed such restricted dimensions, (the aggregate area and yield having been only 250 acres and 8,800 lbs. on the average of the five years ending 1907), that it has not been thought worth while to continue the returns rendered in previous years by these provinces. Even in Southern India the cultivation of coffee is by no means general ; it is confined for the most part to a limited area in the elevated regions above the south-western coast, the coffee lands of Mysore, of Coorg and of the Madras districts of Malabar and the Nilgiris comprising about 90 per cent. of the whole area under the plant ; and even in some of these districts coffee is in

places giving way to tea or, where the altitude is not prohibitive, to rubber. More than half of the 90 per cent. is in Mysore, where there were 102,903 acres in 1908-09; Coorg had 44,316 acres while the Nilgiris and Malabar had between them some 33,000 acres. Madura, Salem and Coimbatore are the other districts in Madras in which the industry exists, and coffee is also grown to an appreciable extent in Travancore and Cochin.

The total estimated area shows a progressive decrease since 1896. On those estates for which reports have been received from planters the total area of new lands planted with coffee in the year of report is only 7,000 acres, while the total area of old cultivation abandoned is 8,820 acres, which represents a net decrease of 1,816 acres under coffee cultivation.

PRODUCTION, CONSUMPTION, EXPORTS AND IMPORTS.

(a.) PRODUCTION.

It will be noticed from the comparative table below that while the area under coffee has been steadily diminishing, since the season 1896-97, production, as judged from exports, which account for the greater part of the crop, has fluctuated from year to year, a small crop generally alternating with a heavy one. It touched the highest point since 1887-88 in the season 1904-05. In 1906-07, however, unseasonable rains were reported from nearly all the principal coffee-growing districts, and the total quantity exported in 1907 decreased by about one-half. In 1908 the shipments showed a small recovery which has not however been sustained in the year under review. Taking 100 to represent the area in the season 1885-86 and exports in 1886 the variations in both from year to year are stated below:—

Season.	Area.	Exports.	Season	Area.	Exports.
1885—86	100	100	1897—98	122	49
1886—87	98	65	1898—99	121	89
1887—88	108	95	1899—00	115	50
1888—89	104	56	1900—01	115	79
1889—90	110	68	1901—02	110	47
1890—91	114	46	1902—03	100	85
1891—92	111	86	1903—04	96	65
1892—93	110	66	1904—05	91	90
1893—94	112	71	1905—06	90	80
1894—95	117	70	1906—07	89	39
1895—96	119	71	1907—08	88	82
1896—97	128	50	1908—09	86	52

(b.) CONSUMPTION.

It is impossible to arrive at any estimate of the quantity of coffee consumed in India; but it must be considerable, for in Southern India, at all events, there are none but the poorest who do not drink coffee and no bazaar so small that coffee is not procurable.

(c.) EXPORTS.

[A tabular statement gives the following totals of Exports:—

1905	...	41,188,720 lbs.
1906	...	36,584,688 ..
1907	...	17,866,128 ..
1908	...	87,568,832 ..
1909	...	28,625,504 ..

The two chief markets for Indian coffee are the United Kingdom and France.

[Tables are given to show the relative position held by Indian coffee in the imports of the countries as compared with other coffee.]

Indian coffee seldom goes direct to the United States, which consume nearly one-half of the total quantity of coffee exported from all the countries of the world.

(d) IMPORTS.

The import of coffee is inconsiderable in volume, averaging about 900,000 lbs. yearly. It comes mainly from the Straits Settlements and Austria-Hungary and is taken by Bombay and Burma in almost equal shares.

PERSONS EMPLOYED.

There were 20,401 persons returned as permanently employed and 6,350 persons as temporarily employed on the coffee estates in 1908-09. The returns for the Nilgiris district and the Travancore State are incomplete. The figures represent the average number of daily attendances throughout the year, and cannot be taken as exact.

PRICES.

Taking the declared export values to represent the prices, the variations since 1894-95 are shown in the figures appended.

Price					Variation	Price					Variation.
per cwt.						per cwt.					
lbs. a. p.						Rs. a. p.					
1894-95	...	75	7	2	100	1902-08	49	1	5	65	
1895-96	...	75	9	0	100	1903-04	46	15	2	62	
1896-97	...	75	3	1	100	1904-05	50	6	2	67	
1897-98	...	67	8	2	89	1905-06	48	12	4	65	
1898-99	...	64	12	9	86	1906-07	48	11	0	58	
1899-00	...	52	12	4	70	1907-08	45	10	2	60	
1900-01	...	149	8	7	66	1908-09	46	0	4	61	
1901-02	...	49	0	4	65	...	...	...	...	...

[Among portions of the above Note that are not quoted here, are a detailed table of exports by sea during the last five calendar years and the countries to which they were directed; a table of Imports from India into the United Kingdom; another of Imports from India into France (showing that the latter country now takes almost as much East Indian Coffee as is imported by the former); notes of variations of prices of Brazilian Coffee in New York; a table exhibiting the Duty on Coffee in the principal consuming countries; abstract statements of the area under, and the production of, Coffee in India from 1885 to 1908-09; and a detailed statement of the production in India during the year ending June 30, 1909.

According to this list the chief producing areas were:—

Mysore	...	12,918,880 lbs.
Nilgiris	...	5,915,840 "
Coorg	...	5,904,640 "
Salem	...	1,283,520 "
Malabar	...	696,640 "]

The supply of Camphor trees in the settled district of Formosa is steadily diminishing, but plantations are being made in suitable localities. The Government Monopoly Bureau is stated to have restricted the output of camphor and camphor oil for 1910 to 6,670,000 and 7,330,000 lbs. respectively. The recent establishment of two celluloid factories in Japan will doubtless favourably affect the camphor industry in Formosa.

The distillation of camphor from leaves is still in the experimental stage.

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Coffee Curing.

Replies have been received from some of the firms addressed regarding the resolution adopted at the recent Annual Meeting about reduction of charges and improvement of machinery for Coffee-curing.

One firm writes :—

"We much regret we do not see our way to make any reduction in our charges for coffee-curing.

"Planters seem to forget that Curers have been to great expense in putting up large works and machinery, and in these days when coffee crops fall so short, the profits are much less, although the same supervision is needed.

"With reference to the improvement of machinery, if it can be pointed out where such improvements can be made, we shall be only too glad to give it our very best consideration. But it seems to us that although the machinery still employed by us may be cumbersome, it does the work remarkably well, and would be difficult to beat.

"The saving in curing charges, if reduced, to individual planters would be small, compared to the loss that the curers will have to bear in the present position of affairs with smaller crops."

Another firm remarks :—

"In reply to the first part of the resolution we regret we are unable to reduce charges for Coffee-curing. The quantity of Coffee which is produced now shows a serious falling off in several Districts, and in all a diminishing tendency, and in our opinion the prospects of Coffee Curing Works generally are none too bright.

"In reply to the second part of the resolution, it is our custom to give periodic consideration to the question of possible improvements, and we are always ready to give our best consideration to any suggestions in this connection."

A third firm states that one of its representatives is now on leave in Europe "and will make inquiries there about improved Coffee Curing machinery; meanwhile, however, we must say, we have not heard of any machinery likely to turn out a better sample than the machinery now generally in use."

A fourth firm writes as follows :—

"We beg to own receipt of your letter of the 23rd instant communicating a Resolution unanimously adopted at the recent Annual Meeting of the U. P. Association, S. I., regarding (1) the proposed reduction of curing

charges and (2) the alternative of making improvements in the curing machinery, and asking us to state our views thereon.

"As regards the first part of the Resolution, we might say at the outset that our views on this matter are, under the present circumstances, the same as those expressed in the letters published on pp. 231-32 of '*The Planters' Chronicle*' for October last. Speaking for ourselves, therefore, we regret to say that we cannot see our way to meet the wish of the planters for a reduction in the current curing charges, however much we may desire to do so. And as to our neighbours, we are afraid that, with the solitary exception of Messrs. Volkart Bros., they will all be constrained to express the same view with ourselves. Taking, then, this to be so, we fail to see how a change in the direction desired by the planters could possibly result from a reconsideration by the curers of the proposal in question, all the circumstances of the case remaining unaltered.

"Coming to the second part of the Resolution, we beg to point out that the proposal for improvements in the curing machinery presupposes the machinery in use at present to be below the mark, while it makes the general admission that, like everything else, the curing machinery, too, is capable of improvement. We have nothing to say here to the latter implication; but, in regard to the former, we would ask you to consider for a moment whether that supposition is correctly based. Using, as we do, the best machinery available for our purpose—and no curer, desiring for good results, would be tempted to use imperfect machinery to save a little money against tremendous risk—we naturally think that all our neighbours, too, do as we do. We do not, however, deny that that machinery is absolutely incapable of being improved. But, unfortunately, the part of the Resolution, which we are considering, is exceedingly vague on this matter in that it does not point to any particular improvements such as the planters would wish the curers to make in their existing apparatuses. We should feel very thankful for further enlightenment on this point. Meanwhile, before concluding, we would draw your kind attention to what we think is not fair to the curers, namely, that they should not be given the credit of being able to judge for themselves on matters that concern them deeply."

The Scientific Officer.

Mr. R. D. Anstead has left the Wynaad in order to visit rubber estates on the Cochin side.

The International Rubber Exhibition, 1911.

Mr L. E. Kirwan, of Madras, has kindly consented to join the Home Committee to be formed by this Association in connection with the above Exhibition, and Messrs. T. H. Allan & Co., of London, have been requested to nominate a representative as a member of the Committee. In both cases the invitations were issued on behalf of the Chairman of the Committee, Mr. J. A. Richardson.

Varieties of Coffee.

In connection with the recent resolution anent Hybridisation of Coffee efforts are being made to get into touch with suppliers of *Coffea robusta* (*C. laurentii*), *C. Liberica*, and *C. stenophylla*, and Maragopipe; also to obtain advice from well known Departments regarding the characteristics of different Coffees and the best means to secure seeds or seedlings.

It would probably facilitate matters if planters who require either seeds or seedlings of any of the above would kindly register their orders with the Secretary.

Any suggestions concerning other descriptions of Coffee that are thought likely to be useful will be very welcome.

Scientific Officer's Papers.**XXXIX.—SOIL ANALYSES.**

"The chemical analysis of a soil aims at ascertaining the amount which the soil contains of the various elements necessary to the nutrition of the plant, with a view of either making good the general deficiencies of the soil, or of adjusting the supply of plant food to such special requirements of a particular crop as may have been indicated by previous experiment." (A.D. Hall, in the 'The Soil.')

The elements usually obtained by a plant from the soil are, Nitrogen, Chlorine, Sulphur, Phosphorus, Potassium, Calcium, Magnesium, Iron, Sodium, Manganese, and Silicon, of which the first eight only are indispensable to the life and well being of the plant.

The amount of Chlorine, Sulphur, Magnesium, and Iron present in ordinary soils is quite sufficient for the needs of the plant, and consequently a soil analysis should show the amount of Nitrogen, Phosphorus, Potassium and Calcium in it, together with the amount of moisture it can hold, the organic matter, or humus, and the Carbonates of Calcium and Magnesium which neutralise acids produced in it.

Too much importance must not, however, be placed on soil analyses. If the total amount of any of the elements of plant food in the soil is compared with the amount withdrawn by any crop it will be found that in the poorest of soils there is sufficient material for a great many such crops.

Take the case of Coffee, for example. From Hughes's analyses, a crop of 5 cwt. of parchment per acre removes approximately the following amounts of plant food per annum :—

	Seed. 560 lbs.	Pulp. 606'4 lbs.	Total. 1,166'4 lbs.
Nitrogen	... 8'2 lbs.	2 lbs.	10'2 lbs.
Potash	... 6' ..	5'4 ..	11'4 ..
Soda	... 0'36 ..	0'2 ..	0'56 ..
Lime	... 1'1 ..	1'1 ..	2'2 ..
Phosphoric Acid	... 1'5 ..	0'5 ..	2' ..

No account has been taken of the amount removed by the leaves, as these form no part of the crop and their constituents are normally returned to the soil, as indeed the pulp should be.

Now a Southern Indian Coffee soil was shown by analysis to contain the following amount of these constituents per acre :—

	per cent.	lbs.
Nitrogen	... 0'136	3,400
Potash	... 0'108	2,700
Soda	... 0'057	1,425
Lime	... 0'616	15,400
Phosphoric Acid	... 0'246	6,150

It is clear, by comparing these two tables, that this soil contains ample material for very many crops, and yet we know that the crops are increased by manure. This is because the soil contains these constituents of plant food in such forms that the plant cannot obtain them, and these inaccessible forms pass slowly, under the influence of weathering, into available forms. For example, of the various forms in which Nitrogen may be present in the soil the plant can only utilise the nitrates, and the amount of nitrates present at any one time in the soil is very small, this amount being constantly renewed by bacterial action, and dependent on the amount of humus present and the suitability of the conditions for bacterial growth.

Phosphoric Acid, again, may exist in the soil in combination with Iron and Aluminium Oxides and be insoluble and unavailable to the plant. In

such a case the plant would naturally respond to an application of soluble phosphoric acid to the soil.

The purpose of a soil analysis then is not to learn the ultimate composition, but to ascertain what proportion of the elements of plant food may become available to plants within reasonable time limits. The ultimate composition, or even the portion soluble in acids stronger or weaker than those exercised by the plant, is of little interest to the planter.

Hence it follows that it is important that a soil analysis should show how much plant food exists in the soil in a form immediately available to the plant, as well as the stores which may be gradually drawn upon. This is usually stated as water, or Citrate, soluble material.

Thus the available Potash and Phosphoric Acid in the soil quoted above were returned in the analysis as:—

	per cent.	lbs.
Potash	0'002	50
Phosphoric Acid ...	0'009	225

which is very different from the results given by the ultimate analysis, and accounts for small crops.

An ordinary soil should show at least 0'01% of Potash and Phosphoric Acid, respectively, soluble in 1% Citric Acid, and 'available' to the plant. If there is less than this amount the soil requires special mineral manures containing these constituents in a soluble form.

However available a manure may be, the whole of it can never be absorbed by the plant; some will escape contact with the roots and be carried away in the drains. How much is actually absorbed depends on a number of factors, more or less controllable, such as the texture of the soil, the amount of water, and the nature of the plant.

The most important item in a soil analysis is, however, the Calcium Carbonate, or Lime, content. On this is based the decision, not only whether liming is necessary, but also what class of fertilisers should be used. When the Lime content is small, below 1%, manures like Superphosphate, and Sulphate of Ammonia, must not be used, but in their place Basic Slag, or Basic Superphosphate, and Nitrate of Soda should be applied.

The amount of organic matter shows how far organic manures like Poonac and Fish are needed. When this item is low it is of little use to add mineral fertilisers alone.

It will be seen then that, though a chemical analysis of the soil alone cannot tell us exactly what system of manuring to adopt, it is of great help as a guide to such a system, which must be finally tested and adjusted to the needs of the crop by actual trial in the field on experimental plots.

The items which are especially needed, and which should be demanded from the analyst, when he makes an analysis of soil are as follows:—(1) Moisture, (2) Organic matter, (3) Nitrogen, (4) Potash, (5) Available Potash, (6) Phosphoric Acid, (7) Available Phosphoric Acid, (8) Lime, (9) Magnesia, (10) Iron and Alumina. Other constituents are of little value or interest.

RUDOLPH D. ANSTEAD,

Planting Expert.

Notes and Comments by the Scientific Officer.

69. *Green Dressings—When to cut* :—It is often asked, when should a Green Dressing crop be cut and turned into the soil to get the fullest advantage of it? It has been found that a plant increases its potash, phosphoric acid, and nitrogen contents up to the time it throws a flower shaft, and that after this they decrease, so that the time to cut the green dressing crop is just as it begins to flower. In a review, written by Dr. Leather, of a paper in the Yearbook of the U. S. A. Department of Agriculture for 1908, which appears in the current number of the *Agricultural Journal of India*, it is pointed out that two experimenters, LeClerc and Breazale, have discovered that growing plants when sprayed with water at intervals during the maturing period lose by solution in the water very considerable proportions of their nitrogen, potash and phosphoric acid contents. "The amounts which are thus removable vary within considerable limits, but are always large, and the authors draw special attention to the case of grass and other fodder crops which are exposed to weather and which must, thereby, suffer deterioration, also that the amounts of material so returned to the soil are considerable from the manurial point of view."

This shows, therefore, that there is not so much loss as was at one time thought by leaving the green dressing to mature, except that a certain amount of the plant food constituents will be concentrated in the seed.

Another point, which the above makes clear, is that the contention that the growing of green dressings robs the permanent crop of food, is a weak one. Not only are all the contents of the green dressing returned to the soil, when it is dug in, or used as a mulch, but they are not even all withheld from the permanent crop in the meantime, but continually supply plant food in a very available form, namely in solution, to the soil; all of which tends to show that 'Weeds' are better than Clean Weeding.

RUDOLPH D. ANSTEAD,

Planting Expert.

THE YIELD OF CAMPHOR FROM DIFFERENT PARTS OF THE PLANT.

In the *Agricultural News*, Vol. VIII, p. 328, a note was given on experiments that have been conducted with camphor in Jamaica and Antigua, and it is pointed out there that, in both cases, the younger parts of the plant gave the largest yields. In experiments carried out by the Agricultural Department of the Federated Malay States the same conclusion was reached, in connection with the amount of camphor that can be obtained by distillation from different parts of the plant. In addition, the following interesting conclusions were obtained: (1) that air-drying, unless it is carried out in direct sunlight, does not reduce the yield; (2) that, under the conditions of the experiment the principal products are camphor, with a small percentage of oil; (3) that in the Federated Malay States, a yield of at least 1 per cent. of camphor, with a small percentage of oil, may be expected from the prunings of trees five years old, and probably from trees younger than this.

Investigations have also been carried out by the same Department with the Borneo or Sumatra camphor tree (*Dryobalanops Camphora*), from which the valuable product known, as Borneo camphor is obtained. This is not a true camphor, but a closely related compound called Borneol. It has not, so far, become an article of general commerce, but is chiefly used in various parts of the East for ritualistic purposes and for embalming.

INDIAN TEA CESS COMMITTEE.

Extracts from the Seventh Annual Report, being that for the year ended 31st March 1910.

The following is taken from the second report of the second period of the existence of the Indian Tea Cess.

Indian Tea in India.

In their last Annual Report the Committee mentioned that the Indian Tea Association (London) had suggested that an attempt should be made to push the sale in India of compressed tea—i.e., leaf or dust tea pressed within a small compass to facilitate distribution. The suggestion had been acted on, and at the half-yearly meeting held on the 29th January 1909 it was resolved to offer a bonus of nine pies per lb. on a million lbs. of compressed tea to be sold in India during the year ending 31st March 1910. It was also stated in the report that the Executive Committee were in communication with distributors and that, although some delay had been caused by the difficulty of obtaining suitable machinery, it was hoped that a machine would soon be available. This hope was, the Committee regret to say, not realised. Enquiries, regarding the bonus were received from various quarters, but in the absence of a machine capable of producing compressed tea on a commercial basis the sum of Rs.46,875 (9 pies per lb. on 1,000,000 lbs.) voted for the year under review was not drawn on. As it is understood that a satisfactory machine has now been designed, however, there has been allocated for the current year a sum of Rs.30,000 for payment of a bonus on compressed tea at the same rate, *viz* 9 pies per lb.

Indian Tea in Europe.

It is a matter of satisfaction to the Committee that they are able to report continued progress in the work of promoting the sale of Indian tea in Continental Europe. The work is controlled by Mr. J. E. M. Harington; his headquarters are at Antwerp, while operations are restricted mainly to Germany and Belgium. In August 1909, Sir James Buckingham, C.I.E., Secretary of the Indian Tea Association (London), visited Germany in order to enquire into the administration of the Cess funds, and he afterwards submitted a full report on his tour. The Committee were glad to see that Sir James Buckingham was of opinion that Mr. Harington was doing exceedingly good work. They had themselves come to this conclusion from Mr. Harington's reports, and it was satisfactory to find that their views were confirmed by Sir James Buckingham.

With regard to the work done during the year under review it is noteworthy that the total sales to all countries from the Antwerp Dépôt were some 16% in advance of the corresponding figures for the previous year. A number of Indian tea rooms have been maintained in different cities in Germany and Belgium. In the tea room on the Leipziger Strasse, Berlin, there was a steady average of over 6,000 visitors per month notwithstanding competition in the neighbourhood and the increased taxes on tea, coffee, and nearly all other articles of consumption. The number of sales of dry tea at this dépôt showed an advance over the figures for 1908-1909. The second Berlin tea room, in the Kant Strasse, also shows an improvement in the sales of dry tea, but otherwise the results have not been so satisfactory and negotiations have been in progress for disposing of this room on a favourable opportunity. The extension of the Hamburg tea room has been followed by a large increase in the attendance of visitors and the receipts, the number of visitors latterly averaging more than 9,000 per month. An Indian tea room and an Indian tea shop have been carried on in Antwerp, where also an attempt is being made to encourage the use of tea among sea-

men and dock hands by the granting of a small subsidy to a private enterprise in the Rue Dubois. Forty-one tea demonstrations were given during the year in Berlin and other German towns, some 30,000 cups of tea 7,000 samples and cards being distributed. In all eight minor Exhibitions were made use of, four in Germany and four in Belgium and Holland, while advantage was also taken of the opening of skating rinks in Antwerp and Brussels to serve Indian tea. On the whole Mr. Harington is satisfied that tea consumption in both Belgium and Germany is distinctly increasing.

At the half-yearly meeting of the Cess Committee on the 26th January 1910 it was decided to allot a sum of £7,000 to Mr. Harington for work during the year to 31st March 1911.

Indian Tea in America.

As mentioned in the report for last year the joint work with Ceylon which had been carried on in America since 1903 came to an end, in consequence of the discontinuance of the Ceylon Cess, on the 31st March 1909. At the half-yearly meeting on the 29th January 1909 the Cess Committee resolved to expend a sum of £10,000 in America during the year under report, and with this amount and an additional sum of £4,000 from the former separate Indian Fund for 1908-1909, the scheme of advertising which had been carried on for the Joint Fund was continued on behalf of Indian black tea only. The Cess Commissioner, Mr. Richard Blechynden, continues to have his headquarters at St. Louis, and during 1909-1910 work was carried on in Missouri, Texas, Michigan, Wisconsin, Colorado, Kansas, Arkansas, Indiana and other States. . . . It may be mentioned that the statistics of imports of tea into America for the calendar year 1909 show a large increase over previous years so far as Indian and Ceylon teas are concerned. Mr. Blechynden estimates the increase of Indian tea imported in 1909 as against 1907 to be no less than 92 per cent.

At the meeting of the Cess Committee on the 26th January 1910 it was decided to allot a sum of £10,000 for the American campaign during the year ending 31st March 1911.

Indian Tea in The United Kingdom.

An explanation was given in the report for 1908-1909 of the reasons which had led the Committee to set aside a sum of £2,000 for advertising Indian tea in the United Kingdom. The form which the work took during the year under review has been the systematic arrangement in different centres of a series of lectures on the subject to the trade and to the general public, in addition to canvassing local grocers, advertising, and the issue of pamphlets and postcards. Mr. A. E. Duchesne, working under the supervision of the Indian Tea Association (London), has been responsible for the propaganda, and the Committee consider that the results are satisfactory. Advertisements to a total number of 1,006 appeared in 48 separate newspapers at a cost, inclusive of the charge for drawings and blocks, of £1,098-8-11, and in addition articles and paragraphs written mainly by Mr. Duchesne appeared in these and many other newspapers. Thirteen lectures were delivered during the year and 90,000 copies distributed of a pamphlet on Indian tea originally written by Sir James Buckingham for the Franco-British Exhibition. 90,000 pictorial postcards were also distributed in the various towns advertised in and a large number of enlarged photographs of Indian tea garden scenes were given to grocers to be used in window displays.

The Cess Committee, at their half-yearly meeting on 26th January 1910 allotted a sum of £4,000 for the continuation of the work in the United Kingdom during the year ending 31st March 1911.

COFFEE.

Manuring in Guatemala.

Writing in a contemporary on Coffee Culture in Guatemala, Mr. Gustav Helmrich remarks *inter alia* that a much more intensive cultivation of the soil is urgently required, through he also states that "as far as the quality of the coffee is concerned, the climate is more important than the soil." Referring to manurial experiments that he has carried out "with the most satisfactory results" he gives the following details, which may interest planters in Southern India :—

Plots.	Manuring per tree in the years 1902—1908 inclusive.	Average yield per tree for Seven Harvests, 1903—1909.
1.	No Manure	16'4 oz.
2.	Complete Manuring— 2'4 oz. Double super. 5'8 oz. Sulphate of potash 9'3 oz. Sulphate of ammonia	22 oz.
3.	Complete Manuring— 2'4 oz. Double super. 5'8 oz. Muriate of potash 9'3 oz. Sulphate of ammonia	31 oz.
4.	1 } Dung plus 1/3 Complete Manuring (rich in nitrogen 8'7 oz.)— 1'2 oz. Double super. 2'9 oz. Sulphate of potash 4'6 oz. Sulphate of ammonia	47'6 oz.
5.	1/3 } Dung plus 1/3 Complete Manuring (poor in nitrogen 7'7 oz. with sulphate of potash)— 2'4 oz. Double super. 2'9 oz. Sulphate of potash 2'4 oz. Sulphate of ammonia	46'4 oz.

As the writer states, these results clearly disprove the idea frequently expressed that artificial manures increase the yields only the first year and then afterwards impoverish the soil. Three reasons for this mistaken notion are discussed :—

(1) The artificials are often not buried deep enough, with the result that they get washed away by heavy rain. To prevent this a small trench of about 8 in. in depth should be made for the manures at the side of the tree, and at the upper side, in the case of sloping land. Besides, this would encourage the growth of new roots in a layer of the soil where they would be protected against drought and heat.

(2) Many planters manure only once and consider this sufficient. This, of course, is a delusion; for after the first treatment, which stimulates the growth and general development of the tree, it requires still more food to sustain it after this spurt, otherwise its strength is bound to give way.

(3) Every tropical soil is subject to a certain amount of flooding during the rainy season, so that in the case of slow-acting artificials we can calculate only on 50 per cent. of their manurial substance being utilized by the trees, and 25 per cent. only with the concentrated, easily soluble manures. The necessity is therefore apparent of doing everything possible by proper cultivation of the land to fix these minerals, and at the same time to encourage a deep-rooting habit in the tree.

Mr. Helmrich states :—"The yield of a plantation could easily be doubled by proper cultivation of the land and the judicious use of natural and artificial manures. . . . The largest quantity of coffee I obtained from one tree was 15 lb., approximately, being the result of a dressing with liquid manure and a simultaneous application of phosphoric acid (18 gr.) nitrogen (37 gr.) and potash (59 gr.) per tree."

RUBBER.

Experimental Tapping of Para.

A very lengthy report on this subject is published in the *Agricultural Bulletin of the Straits Settlements and Federated Malay States* (Vol. IX, No. 7, July 1910.) In the original a number of very elaborate tables are given, but these are much too long to be reproduced here and are not capable of being summarised so as to convey their full significance.

The following extracts will, however, probably interest Rubber planters in South India :—

Apart from some minor experiments [in the Botanic Gardens at Singapore] 1,200 trees were tapped at different times throughout the year. These were arranged in 10 groups, ranging from 50 to 200 trees, and of these, 3 groups were tapped on 1 period only, 5 groups on 2 periods, and 2 groups on 3 periods (the average period being 30 days). Full details of all the work have been recorded and this record shows :—Comparative results of different methods of tapping at different seasons during the year; quantity of latex obtained and amount of resulting dry rubber; increment of growth of all the rubber trees, the ratio of growth when too closely planted; effect on bark by different methods of tapping.

It will be seen that tapping on alternate days shows an advantage of nearly 4% over tapping daily; also that we advocate the single herringbone method of tapping following basal tappings. The disadvantage of close planting is also pointed out.

A long series of experiments were tried in curing freshly collected latex with the aid of smoke with a view to improving the quality of the raw material; a further series of experiments were conducted on the effect of smoke on freshly prepared biscuits and sheets of raw rubber, and . . . the strength and appearance of such smoked rubber has been favourably reported on.

[A summary of the year's work is tabulated so as to show the progress made in comparison with the report published in 1905 and 1906.]

It will be noted that the average yield per tree per annum is comparative only as the periods of tapping vary from 30 to 90 days for the whole year against monthly to bi-monthly periods on estates. There are many reasons, for lightly tapping the garden trees, for instance (a) the yield of Pará trees in Malaya has already proved better than the sanguine estimates of old days (b) the crop of seeds has been, and is still, of the first importance in the best interests of the industry in this country and heavy tapping is detrimental to seed production.

TAPPING.

Daily versus Alternate Days.

The process of tapping Pará rubber trees can be carried out at various seasons and periods of time and also by different methods; but the real result of observations and experiments must be measured by averages and such analyses to be complete should be compiled from the records of two or three years. Possibly no other cultivated product exhibits so much diversity under normal conditions as is the case in the yield of latex or rubber crop.

There are many factors which may vary the yield of latex at any particular season (to be dealt with in a subsequent chapter).

[A statement shows for one year's working that the quantity of latex required to produce 1 oz. of dry rubber—including some added water to

retard rapid coagulation—varies from 2½ fluid ozs. in April and May to 8½ ozs. in February and March. These two latter months, however, represented the principal resting season of foliar periodicity between 1908 and 1909. Following the end of March the tapping season for 1909 began in April and continued good for the remainder of the year].

From this statement it will be seen that while there is diversity in the quantity of latex obtained at different seasons and in different years there is also variation in the composition of the latex itself. This latter variation arises from different causes but no doubt the effect of rainfall is an important factor, when—so far as is known—other conditions are normal. What the variation amounts to is shewn in Table III. It will be seen that during 21 tappings almost daily from the same group of trees the volume of latex varied from 114 to 338 ozs. c/c while the weight of a sheet of rubber prepared daily from 30 ozs. of the latex varied from 6 to 8½ ozs. (avoir-dupois).

[Table III shows variation in the weight of dry rubber prepared from a uniform quantity of latex. 30 ozs. c/c obtained daily and weighed dry sheet.]

Under normal conditions it would be supposed that the yield of latex would be nearly uniform, but that is to suppose that each tree is in the same physiological phase at the time of tapping, which seldom occurs, and explains the variation of groups of trees already shewn. That it is so with solitary trees. Table IV furnishes a proof. It will be noticed that the seasons of tapping were January-February; September-October; and November-December. The season of rest and complete defoliation occurred in March-April and would not affect the seasons of tapping. If the results of three tappings are reduced to 25 tappings each period, the record would then read:—

1st tapping	...	397 oz c/c latex.
2nd "	...	351 "
3rd "	...	395 "

which is fairly uniform.

[Table 4 deals with latex obtained from one tree without added water.]

As so much variation in the yield of latex exists with groups of trees it is necessary for the purpose of establishing an advantage by any method or period of tapping that the advantage is permanent. Table 5 furnishes the result of 6 groups of trees amounting to 860 trees tapped daily and alternate daily occasions during 4 years, *i.e.*, 1904, 1905, 1906 and 1909. From this result Table 5 has been compiled and shews an advantage of nearly 4% on alternate days over daily tappings for four years.]

[Table 5 shows the advantage of Tapping on alternate days over tapping daily, a summary reading as follows:—]

730 trees tapped alternate days 214 times				...	1,055'8 Rubber.		
730	"	"	429	"	...	2,116	"
Plus 50	"	"	429	"	...	145	"
780	"	"	429	"	...	2,261	"
780	"	daily	429	"	...	2,180	"

or approximately an advantage of 4% in favour of tapping on alternate days over tapping daily.

DIFFERENT METHODS OF TAPPING.

Incisions and Excisions.

Throughout the East all plantation rubber is obtained by some method of excising the bark, whereas in Brazil the process is one of incisions. This latter method has been fully tried in this Garden and discontinued for the reason of slow bark recovery of the incised wounds, combined with the poor return of latex—although in Brazil it is claimed that the amount of rubber is higher per tree. This very doubtful and probably refers to the average of old trees compared with young trees in the East. From one of the oldest and largest tree in the Singapore Garden . . . 1,245 oz. of latex were obtained in three periods of tapping during 1909 resulting in 26 lbs. of rubber. (This tree was actually excised on 80 days only for one year), a much larger return than could be obtained by incisions and only a small area of bark operated on.

V-SHAPED METHOD.

So far as we know there is not any difference of opinion as to what part of the tree should be tapped. It should be the trunk of the tree from the base to a height of 5 feet. In our own experiments we find that the dry weight of a biscuit of rubber is most from nearest the base, there is naturally a larger yield of latex from the single or double herring-bone excisions—being +5 or 8-10 excisions against 2 basal excisions—but the dry weight is slightly less from the same quantity of latex while from the upper branches the dry weight is considerably less and—with young trees—the exudation of latex soon ceases.

It is no doubt due to the fact of the richest latex being nearest the base of the tree that the V-shaped method obtains so many votaries. Where the full V is practised half of the girth of a tree is operated on or excised, and the objection to this method lies in the interval of rest between completion of the first half of the area of bark and commencement of the second half. If the second half is followed on immediately the tree is only able to partially fulfil all its functions, it is really stagnated and weakened, and this should be avoided, a half V would only return a scanty yield of latex, the half-herring-bone would therefore be an improvement, as this amounts to 4 or 5 half Vs.

HERRING-BONE METHOD.

The double herring-bone method—something like 4 or 5 pairs of full Vs—has proved too expensive in bark excision and the single herring-bone method—a vertical channel with 4 or 5 half Vs, or oblique excisions at an angle of 45° about 1' apart—is now adopted. This we think the most practical method, both as regards yield of latex or economy of bark and provided the excising of bark is carefully done, *i.e.*, the excisions are uniform and not too deep, improvement would appear to lie in the direction in which the latex is collected rather than by the method of tapping. To retard the rapid coagulation of latex on a practical basis is a problem which does not admit of an easy solution.

BASAL EXCISIONS.

Two excisions representing about one half or slightly more of the girth of the tree. The first excision is opened a few inches from the ground upwards at an angle of about 35°, and the second excision on the opposite side of the tree is opened in a downward direction or reversed angle thus leaving the maximum space on the opposite sides of the tree between the excisions. As compared with the methods already cited there are two collecting cups against one, while the yield of latex is naturally less, being two excisions only. It is however a method to be recommended for young trees for the following

reasons:—quick bark recovery near the base, no distortion of bark; strongest latex; it can be followed by the single herring-bone without detriment whilst the trees have been increasing in girth. A comparison of the yield of latex with the half herring-bone method is shown in Table 6, but it should be remembered that although the gross yield is less, the weight of dry rubber is higher and . . . the yield per excision is more or as already stated the yield of latex is most and best nearest the base of a tree. It should be mentioned, too, that the fall off in the second period of basal tappings . . . is usual in all methods of tapping when there is an interval of rest between tappings.

The actual yield of the half herring-bone trees . . . was 3,511 oz. for 24 times tapped, the differences being added by computation. This group of trees was tapped on three occasions during 1909, with the following results:—

TABLE 7.

No. of trees tapped.	No. of times tapped.	Method of tapping.	Total fluid oz. obtained.
90	34	Basal	24 11
90	34	Basal	12 61 without added water.
90	24	Half Herring-bone	35 11 including water.

It should be pointed out that on both occasions of the basal tappings there was no water in the collecting cups, as the latex was required for curing by smoke. Compared with the half herring-bone tapping the latter was plus added water and both basal tappings minus water and the further loss, at least measureable loss, of clotted latex which always occurs (with young trees) unless the latex drips in small portion of water. It emphasises the fact however that a half herring-bone tapping can follow basal tappings with advantage. There is also a still further advantage in first tapping young trees by basal excisions in respect of uniform bark recovery. As a consequence of a vertical channel with herring-bone excisions the renewed bark is occasionally turgid, sometimes suppressed buds appear, while—so far as we have observed—this does not occur with trees first tapped at the base, for the reason, we suspect, of the new bark growing upwards or downwards only while bark tension has been relieved.

It is sometimes stated that in bark renewal the new bark grows best, if not entirely, in a downward direction. It is not what actually occurs, and if an excision of one, two, or more, inches wide is left intact for a sufficiently long period it will be found that the line of union between the downward and upward bark is in the centre of the excision. When, however, the tappings of the bark is being excised for a long period and the downward bark has commenced growing, the line of union will be below the centre, but the upward growing bark continues—as well as the two sides of the vertical channel in the double herring-bone tapping—towards the vertical—with the result that the renewed bark is turgid and frequently accompanied with various protuberances.

A consular report from Hamburg states that although the consumption of Tea in Germany has made only slow progress, it is in sufficient use to exclude the possibility of such depreciation as the trade was subject to formerly. The increase in the duty, which came into force on August 1, 1909, *viz.*, from 25 pf., per kilo. to 1 mark per kilo., the anticipation of which caused much uneasiness, does not appear to have any serious effect upon the consumption. The prospects for 1910 appear to be good and sound. The large supplies of Indian teas failed to depress prices.

The Planters' Chronicle.

RECOGNISED AS THE OFFICIAL ORGAN OF THE U. P. A. S. I., INCORPORATED.

VOL. V. No. 34]

SEPTEMBER 10, 1910.

[PRICE AS. 4.

THE U. P. A. S. I.

(INCORPORATED.)

Book of Proceedings, 1910.

This publication is expected to be ready for despatch by the 21st instant, and it is hoped that orders not registered already will be kindly sent in early. The price is Rs.1-8, per V.P.P. (postal charges included).

Coffee-Curing Charges.

In continuation of correspondence quoted in last week's issue the following extract from a letter addressed to the Secretary, U.P.A.S.I., by another firm of coffee-curers is given :—

"We duly received your letter of 23rd ultimo conveying copy of a resolution which was adopted at the last Annual Meeting of the above Association, and in reply thereto we beg to inform you that the associated firms of Coffee Curers on this Coast have agreed that the Mangalore and Tellicherry firms may allow certain rebates in favour of proprietors of Estates in Mysore and Coorg in terms of the enclosed copy of our Circular of 10th ultimo. We may mention that the reason why these rebates are limited as above is because Mangalore and Tellicherry curing rates have always been fixed at Rs.2-8-0 per ton higher than those in other towns.

"As regards making improvements in our Curing machinery, we should be only too glad to adopt any improvements on our present system which have been proved capable of adding to the value of cured coffee. The following particulars of prices realised this season for a few of our shipments of High class coffee, cured in the same way as all the crops entrusted to us are cured, will prove that we can deal with such coffee satisfactorily.

No.	lot	A.	B.	C.	P.	T.
		95/6	60/6	...	94/6	...
2	"	91/6	71/-	...	109/-	...
3	"	89/-	62/6	...	90/6	...
4	"	98/6	70/-	58/6	92/-	53/- "

(INCLOSURE).

Copy of Circular Letter.

We have the pleasure to inform you that the associated firms of Coffee curers on the coast have agreed to the following :—

"Rebates not exceeding 5 per cent. on the curing charges may be allowed to proprietors who settle their accounts by the 30th June, and to constituents who may wish to pay curing and other charges from time to time, before the close of the season. Discounts on such payments from date thereof up to 30th June may be allowed at Bank rate, not exceeding 10 per cent. per annum, said rebates and discounts to be restricted to Mangalore and Tellicherry firms, and by them to Estate proprietors in the planting districts of Mysore and Coorg."

We shall be happy to treat your account accordingly.

Volume V/1 "The Planters' Chronicle."

This first of the series of *half-yearly* volumes should be ready about the same time as the U. P. A. Book of Proceedings, or even a little earlier.

The price is Rs.2 per V.P.P. (postal charges included). The volume comprises the weekly issues from January 22 to July 9, 1910, together with a very comprehensive index.

Rubber Samples.

The specimens of Rubber left over from the little Exhibition held at the U. P. A. Office early last month have now been delivered to the Superintendent of Government Gardens and Economic Botanist, Mysore, firstly, for display at the Mysore Dasara Industrial Exhibition to be held next month, and, afterwards, to be transferred to the Mysore Government Museum, at Bangalore.

S. I. P. B. F.

SUBSCRIPTIONS, &c., JULY 22 TO SEPTEMBER 8, 1910.

Per NORTH MYSORE P. A.

	Rs.		Rs.
Morgan & Son	... 200	H. H. Stephenson	... 10
G. R. Oliver	... 200	C. W. Trevor Roper	... 10
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Per MUNDAKAYAM RUBBER P. A.

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" (1910)	... 40	J. R. Vincent	... 20
A. Hamond (1909)	... 20	G. Atkins	... 15
" (1910)	... 20	W. R. Asher	... 10
			— .. 405

Per ANAMALAI P. A.

G. L. Duncan	... 40	H. W. de Salis	... 10
O. A. Bannatine	... 40	J. H. J. Jones	... 10
G. A. Marsh	... 40	A. C. Cotton	... 10
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A. H. Sharp	... 40	J. O. K. Walsh	... 10
C. H. Brock	... 40		— .. 290

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J. G. Hamilton	... 10	Graham Anderson, C. I. E.	... 10
F. M. Hamilton	... 10	Thiselton Anderson	... 10
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C. Lake	... 10	C. J. Hayward	... 10
S. Sladden	... 10	E. S. Broughton	... 10
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J. Aird	... 10	E. C. Foster	... 5
			— .. 170

Per WYNAAD P. A.

D. H. Macleod ¹	... 10	W. E. Glenie	... 10
H. Atzenwiler	... 10	C. E. Abbott	... 10
A. Trollope	... 10		— .. 50

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F. M. Cockburn	... 10	R. Bake	... 10
			— .. 40
			Rs.1,475

Amount received up to July 21, 1910 Rs.3,644
 „ since „ „ 1,475

Total Rs.5,119

* Yearly subscription, promised for five years.

TOTAL PAYMENTS TO DATE THROUGH THE DIFFERENT DISTRICT PLANTERS' ASSOCIATIONS.

North Mysore	... 1,485	Central Travancore	... 275
South Mysore	... 609	Shevaroy	... 210
South Travancore	... 545	Kanan Devan	... 190
Coorg	... 500	Wynaad	... 50
Mundakayam	... 405	Nilgiri	... 40
Anamalai	... 290		— Rs.4,599
Payments received direct	...		.. 520
			Rs.5,119

Scientific Officer's Papers.**XL.—GREEN MANURING AND THE USE OF COVER CROPS.**

When considering the all important subject of Soil Management there is one point to which planters often do not give sufficient weight, and that is the damage and monetary loss caused by wash.

The top few inches of the soil are over and over again the most important of all to the crop. Endless time and money is spent in getting a good tilth and making the surface soil of such a mechanical condition that it will readily absorb moisture on the one hand and retain it on the other. This top soil when in good condition is the home of myriads of bacteria which render the fertilising constituents available to the plant, and to it is added manures. Consequently every effort should be made to retain every particle of it if possible.

A large number of crops are more or less surface feeders, and if they are permanent, like Coffee, Tea, Rubber, Cocoa, &c., it is especially important that the surface soil should not be removed. The heavy rains experienced in the Tropics, often as much as 40 inches in a single month, if they fall on bare land carry away enormous quantities of top soil into the drains and rivers, and the rich alluvial plains of countries like India have been formed by years of wash from the hills above them. Where estates are kept clean weeded and the soil left bare and exposed, the rivers and streams in the wet weather are choked with fine silt being carried away, silt which represents the tilth so carefully obtained during the year, and it is no uncommon sight on such estates to see the roots of the Tea or Rubber, as the case may be, sticking up several inches above the level of the ground, showing where the old surface used to be and the loss which has been sustained. On all sides it is agreed that this is wrong estate practice, and all kinds of devices, such as trenches, and pits, to catch the soil, are resorted to in order to prevent the wash.

The simplest method of preventing surface wash is to grow a cover crop to break the force of the tropic rain and hold the soil together with their roots. The beneficial effects of such cover crops in controlling the loss of surface soil by wash is admirably shown by the following series of experiments conducted in Ceylon at the Peradeniya Experiment Station, on average sloping land. The rainfall during the year was 59'03 inches.

Plot treatment	Wash in tons of soil from April 1909 to March 1910 per acre.			

Bare weeded	115
Dadap (Erythrina)	106
Deep forked	79
Albizzia	67
Ipomoea	45
Crotalaria incana across slope	43½
Mixed Crotalaria and Indigofera, 1 foot apart, up slope...				26½
Crotalaria across slope, 1 foot apart, in the rows ...				26½
Desmodium	12½

In addition to preventing wash and the loss of valuable soil, cover crops, if they consist of Leguminous plants, have another beneficial effect. They add Nitrogen to the soil year by year, the most expensive of all plant foods to buy. This they abstract from the air through the medium of bacteria in the nodules on their roots, a phenomenon too well known nowadays to need any description. Soils which have been under natural vegeta-

tion for many years are always found to be rich in Nitrogen, and this Nitrogen has been taken from the air and accumulated in the soil largely by the action of the Leguminous plants in the flora. (Vide Scientific Officer's Paper XX, *Planters Chronicle*, Vol. V., p. 89.)

It is sometimes objected that cover crops rob the primary crop of plant food, but this removal of food is only temporary, as the cover crops are never removed from the soil, but are from time to time cut down and dug in or allowed to rot on the surface, so that their constituents are restored to the soil, and in such a condition they become rapidly available to plants. The best plan is to apply dressings of Potash and Phosphates to the soil and then grow a leguminous cover crop on it to supply the Nitrogen.

The most suitable plant to grow depends upon local conditions; the flora of any estate if carefully examined will be found to contain many leguminous weeds, and it is both cheaper and easier to establish one of these than a plant introduced from another country or district which is very likely unsuited to the local conditions, or may be attacked by a local pest.

The ideal cover plant is a non-climber which makes a thick cover and does not grow to a height of more than about two feet; a rapid grower, persisting in the dry weather; not attacked by disease to which the permanent crop may be susceptible or by diseases of its own. Many plants can be found which comply with these demands fairly well, and such should be used.

The starting point is a clean weeded estate. There can be no half-way house between cover crops and clean weeding. The weeds should be removed and destroyed as soon as possible after the clearing is made, and it is essential that certain plants which are known to be harmful should be eliminated, and then the cover crop should be established and cultivated: it is no longer a 'weed' but a desirable plant grown for a specific purpose.

Cover crops thus established aid the conservation of the soil, add Nitrogen and Humus to it, and at the same time reduce the weeding bill to a minimum, an item of estate expenses which is usually a very heavy one in the Tropics.

RUDOLPH D. ANSTEAD,

Planting Expert.

A Reuter's telegram dated London September 5, 1910, states:—

At the meeting of the British Association this afternoon, Drs. Russell and Hutchinson announced the discovery of a micro-organism which destroys bacteria essential to the soil for fertility. They characterised it as the most important agricultural discovery for fifty years. The experimenters had discovered that heating or antiseptic treatment killed numerous organising bacteria. These treatments thus enormously increased the fertility of the soil, and, working along these lines, they discovered the actual micro-organism.

The coffee plantations on the Santa Marta slope of the Sierra Nevada in Colombia are fairly prosperous, but the difficulty of procuring suitable labour, which is now being felt more than ever before, prevents the planters from extending their cultivation. The output of coffee in 1909 was practically the same as in 1908, and the prices obtained for it compare very favourably with those of the best coffee exported from Colombia.

RUBBER.

**Notes on the Cultivation of *Hevea Brasiliensis*
(Para Rubber) and the Yield of Rubber Crop.**

Pará rubber is a crop which, if the plantations in the East are carefully tended, might be continued for 60 years. The life of a tree or estate may be lengthened or shortened by the treatment accorded, but, as will be shown in these notes, the real test of successful cultivation in view of prospective crops depends entirely on the annual increment of growth of the trees. It is an indisputable fact that the ratio of yield increases with the size of a tree, both in respect of dry weight of rubber and better latex-producing rubber. The following statement illustrates both facts :—

SMALL AND LARGE TREES.

No. of trees tapped.	Aggregate girth at 3 ft. from ground.	Number of times tapped.	Fluid oz. of latex	Dry weight of rubber	Ratio of fluid oz. to oz. avoirdupois.
Small Trees.					
90	220' 5"	24	3,511	37 lbs.	5 15/16 Nov.-Dec.
120	276' 10 1/2"	26	3,433	43 "	4 15/16 Oct.-Nov.
100	276' 10 1/2"	28	3,981	48 "	5 3/16 Sept.
310	774' 2 1/2"	26	10,925	128 "	(Total small trees)
Large Trees.					
150	743' 4 1/8"	30	18,748	251 8	4 1/8 Nov.-Dec.

It should be pointed out that the large trees have not been specially selected and the returns from the same trees were much more favourable in 1906, when these 150 trees supplied 15,280 oz. of latex which resulted in 268 lbs. of rubber. For the purpose of this comparison, large and small trees were selected which had been tapped concurrently, and the apparent facts must be convincing, *viz.*—310 trees of an average girth of 2ft. 6in. furnish more than half (slightly over 9/16) of the quantity of latex and only about half the dry weight of rubber of 150 trees of an average girth of 4ft. 10in., *i.e.*, the large trees were less than half the number of young trees; girth less; latex less *pro rata*; dry rubber nearly double.

The difference in the quantity of latex between young and old trees of nearly the same aggregate girth is not very large, although variable; it is evident, however, that the ratio of caoutchouc to the volume of latex between young and old trees is considerably higher in old trees; thus :—

No. of Trees.	Total Girth.	Latex. Young Trees.	Dry Rubber.
90	220' 5"	3,511	37 lbs.
120	276' 10 1/2"	3,433	43 "
100	276' 10 1/2"	3,981	48 "
		Old Trees.	
50	209' 4 1/8"	3,323	75 "

In previous reports we have called attention to the necessity of wide planting as the most important factor in the annual increment of growth of rubber trees. Such increment, we consider, should not be less, for the average of an estate, than two inches per annum between the third and thirtieth years.

The increment of growth of Pará trees is variable according to situation, soil, humidity; but the ratio of increment also varies according to the age of the tree, thus :—

	1904.	1905.	1906.	1909.	Increment 6 years.
5 years old	1' 5 1/8"	1' 9 3/8"	2' 1 1/8"	2' 11 3/8"	1' 5 3/8"
5 "	1' 6 1/8"	1' 11 1/8"	2' 3 1/8"	3' 0 1/8"	1' 6 1/8"
16 "	3' 9 1/8"	3' 11 1/8"	4' 3"	4' 10 1/8"	1' 1"
28 "	9' 1 1/2"	9' 3 1/2"	9' 5 1/2"	10' 0 1/2"	0' 11"

We would estimate the ratio of growth where the general conditions are fair as follows :—

From 5 to 15 years	...	...	3 to 4 inches per annum.
" 15 " 20 "	...	...	2 " 3 "
" 20 " 30 "	...	...	1 " 2 " "

The normal increment of growth, however, may be modified in any particular year through prolific seeding. It has been ascertained with oaks and beeches in temperate countries that the annual concentric ring of new wood may be reduced as much as 50 per cent. as a result of heavy seeding.

There is a far more important cause which checks the normal growth of Pará trees when overcrowded. With trees in general there is usually some excess of food assimilated which gradually accumulates until exhausted or disposed of by a heavy crop of seeds ; but in rubber trees regularly tapped, the plant food formed by the tree has not only to provide the formative substance of a seed crop as well as find nutriment for the cambium zone, but it has also to furnish material for new cell walls which are regularly formed as tapping proceeds. To meet this extra demand well developed trees with abundance of leaves—really manufacturing organs—are necessary, but as a consequence of overcrowding and the resulting struggle for existence a small crest of leaves manages to reach the light and such diminished organs are incapable of elaborating the necessary food.

It does not appear to us that such trees suffer directly as latex producers. All our observations and experiments tend to show that the laticiferous system acts as a specialised or reserve storage of water. In a previous report we have called attention to the varying dimensions of the girth of a Pará tree during the course of a day. We pointed out that a tree measuring 3 feet in girth, at 3 feet from the ground, in the early morning, might contract as much as half an inch by mid-day on bright sunny days and conversely, on sunless wet days be swollen to tension point and measure over 3 feet in girth. The tree is a true hygrophyte and is capable of absorbing and evaporating an enormous quantity of water, but—as shewn by the fall in girth on sunny days—evaporation is so much more rapid than absorption—and considering the soft outer layers and large pores of the wood—the tree would doubtless be wilted except that it does appear there is a minimum limit below which the latex never falls, and trees tapped late in the day yield very little or not at all because the pressure of water necessary to complete exudation—after the tubes or sacs have been wounded or punctured—is insufficient.

What really occurs may be expressed as wound response but, in effect, and as judged by results, it is the compensating action of the tree in replacing escaped water and it would appear in excess of normal during a tapping period or season. This appears so from several phenomena, the most important being :

- (a) the change that always takes place in the colour of prepared rubber from a yellow tint to white.
- (b) increase of latex.
- (c) shrinkage of prepared rubber to volume of latex.
- (d) return from the excess of latex to normal in volume, colour, and weight after a period of rest.

The change referred to in the first three instances takes place between the fifth to the tenth tappings and appears to be entirely influenced by the number of tappings and not by the time elapsed, thus : 140 trees tapped in May on alternate days and in the following December and January daily, exhibited increase of latex on both occasions after the sixth tapping, although 12 days had elapsed in the first against 6 days in the latter instance. The increase of latex or "wound response" is variable, however, and is usually

exhibited in the second and subsequent periods of tappings after fewer tappings than on the first occasion.

- (a) Change in colour. There is always a change in colour of coagulated rubber, when the trees have been tapped periodically, and this change, from a tint of yellow to white, takes place at the time of increase of latex. It should be noted that at seasons of heavy rainfall coagulated rubber is then white as a consequence of excessive moisture.
- (b) Increase of latex. Most noticeable after the sixth tapping, and with the increase comes the change of colour referred to.
- (c) Shrinkage. The quantity of coagulated rubber is not in exact ratio of the increased volume of latex. For some reason this is not so easily ascertained by weight as by measurement; e.g., supposing biscuits or sheets of rubber are required of uniform thickness, after the earliest tapping it is necessary to reduce the measured quantity of latex for a few mornings, and afterwards add to the quantity estimated, and a reason for this is naturally suggested as due to shrinkage owing to the higher percentage of water in the increased latex.
- (d) Return from increased to normal. If trees are rested after a period of tapping the exceptional characteristics we have recorded disappear and such trees return to their normal condition.

We infer that a Pará tree always contains a minimum supply of latex and the loss sustained by tapping is compensated for by an increased in-take and stowage of water which gradually affects the colour and volume of latex exuded and although there is shrinkage or loss of weight in proportion to volume such loss is more than compensated for in the increased volume of latex. We would add that, in our opinion, coloured rubber is the strongest.

The progress or condition of an estate should not be considered from the view of yield of latex, as this may be good as long as the bark lasts and quick bark renewal can only be effected when the increment of growth is satisfactory. Overcrowded trees are the first to suffer. The cambium zone is starved and instead of an increment of growth of some inches, the annual concentric ring is scarcely perceptible and bark renewal is not only slow but the new bark is thin and very slightly latex bearing. How far growth may be checked, or rather the alarming extent to which growth may be checked, is shewn by the following figures in which trees closely and widely planted are compared. The closely planted trees are now 24 years old planted on a triangular piece of ground measuring 1 Rd., 34 Pl., and contains 322 trees. There is an outside row of 38 trees which were planted a little earlier and are somewhat better spaced and have a much larger supply of light, air, and root room. The increment of growth for the past 6 years is as follows:—

38 outside trees	increment for 6 years	8½ inches or 1½ inches per annum.
248 inside	" " "	4½ inches or ¾ inches per annum.

In other parts of the garden where the spacing of trees has been better the increment of growth amounts to 13½ inches for 6 years or 2½ inches per annum.

Trees at 20 years old should be 30 feet apart. Estates therefore intended to last for a full period of life, say 60 years, should be spaced well apart or they will not continue to yield fully for the whole time. A hundred and fifty large trees planted far apart and allowed to attain their full development are actually more valuable than five hundred smaller crowded trees of the same age, though these have a larger tapping area of bark. It may be noted too that not only would they actually produce a large and better quality of caoutchouc but they would also be cheaper to tap.—*Straits Bulletin*.

Fomes Semiototus.

A most interesting lecture was given in the S.V.C. Drill Hall Recreation Room, Singapore, on August 20th, by Mr. H. N. Ridley, Director of the Singapore Botanic Gardens, there being many planters present.

Mr. RIDLEY said: I suppose every one here knows the fungus by sight, and knows too approximately its life history, as far as that is known. I will give an account of its appearance in the Botanic Gardens, as an illustration of the way it attacks. The ground on which rubber trees had been planted

in about 1886, had grown up to some extent in secondary jungle, other trees had got mixed in, and these had been cut out, their roots more or less removed. One day a careless cooly piled up some rubbish near one of the trees and fired it, so that two trees got badly burnt. I thought they would recover, but they did not, and fungus attacks destroyed them; one of these fungi was *Fomes*, and this gradually spread through the adjacent trees, killing them one by one on each side of the first injured ones. Now I call your attention to the fact that there had been old scrub trees on the ground in which probably *Fomes* had been growing, and that the burning of the rubber trees started the outbreak. The fungus attacked not dead, but dying trees. Is not this what practically happens in a new clearing? We fell the forest and burn it. This leaves just under ground stumps of trees of different sizes in an injured and slowly dying state. The *Fomes* common in all woods, is in one of these trees and begins to develop on the dying stumps. The roots of the planted rubber come into contact with those of the infected stump, and the mycelium spreads to the living root of the rubber, covering it with its white strands and killing it. Spreading from root to root where they are in contact it kills all the roots of the tree, and down comes the Rubber tree.

WHEN THE TREE IS DEAD,

or almost so, the fruit, in the form of the wellknown yellow brackets, appears, and from the under side of these are produced spores which can be carried by the wind to another injured tree and attack it. Now it is obvious that, in a case like this, the spore brackets could be destroyed even before they are ripe and the plant prevented from carrying on its destruction by spores, and if this was the only danger from it, it would not trouble us much. The danger lies in the underground mycelium which may be tied in the ground for some years, creeping on the dying roots of trees and showing no signs of its presence till the death of a rubber tree is noticed.

It is probable that, by destroying the brackets before the spores are produced, continuously, that is to say, preventing its reproducing itself by spores on the living trees, the mycelium would die out, that it could not go on indefinitely growing mycelium. But this is too slow and before this happens much damage may occur, and it is necessary to destroy the mycelium itself. We have attempted to do this by soaking the ground with Bordeaux mixture, copper sulphate and lime, and by digging solid copper sulphate and lime into the ground, but neither of these methods has had the desired result. This is due I think to the roots of the rubber being too deep underground for the liquid in sufficient quantity to soak in to reach the affected roots. An aid to cleaning infected ground lies in the use of bananas, or some such plant. The *Fomes* is unable to attack the roots of the bananas which aid by destroying with their roots the small dead bits which harbour, so to say, the mycelium. Failing any direct method of reaching the underground mycelium by liquid fungicides, the only thing that appears to be practicable is the thorough cleaning out of the ground of all stumps and dead roots of jungle trees. The mycelium I find remains on very small pieces of dead roots, in an active condition, and the ideal way to destroy it utterly, of course, would be to plough the ground thoroughly to expose and break up these little pieces, but this is, I fear, in the present state of our agriculture, impossible. I have no reason to believe that the spores of this fungus can attack a Pará rubber tree which is uninjured or even wounded say by tapping. I have seen the brackets in actual contact with living trees of different kinds, with no evil results. I believe it only attacks dying and decaying stumps at first and that its mycelium spreads along the roots in contact with the infected portion. In this way it can pass under paths, but deep drains seem to act as a barrier.

THIS PEST HAS BEEN CALLED DIE BACK,

but, as I am by no means certain that all the diseases here and in Ceylon which have been called Die back are the same thing, for fear of mistakes, I prefer to use the scientific name of *Diplondia*, which, unlike many scientific names, is easy to pronounce and remember. This fungus is very small and inconspicuous. Its spores are very minute and are produced in immense abundance after rain. When these spores reach a wounded rubber tree, they germinate in twelve hours, putting out a minute thread which enters the cambium layer and commences to grow. It generally, if not always, attacks a cut or broken shoot and descending, kills the cambium layer. The growth is rapid and it has been known to kill a four-year-old tree in about three weeks after its first being noticed; all that is visible at first is that the top of the branch is dead, it generally exudes a little latex which runs down and turning black makes fairly conspicuous streaks, but this is not always visible. On the bark are to be seen little raised pustules with a crack across the centre; these are black within. As soon as rain falls the fruit ripens and a substance like soot appears in strings and irregular masses, from these pustules. This substance consists of myriads of minute spores, elliptic and divided transversely in two and black in colour. In the case of a seedling the disease pushes down the stem killing it as it goes, but, in a strong plant, its course is checked. The seedling throws out a lead, below the dead and dying end, the disease stops, and the dead portion falls off. You will see at once the danger of this pest. It starts almost out of sight in big trees, at the end of a shoot, it is difficult to get at, it is readily dispersed to great distances by the wind, its spores are produced in unusually large amount, and it is very rapid in growth and development. When detected it can be checked by cutting off the infected bough and burning it, at the same time spraying liberally with Bordeaux mixture; still a tree may be badly injured and at least its output of latex restricted by the necessary amputation. However, in carefully-watched plantations the injury may be minimised. But are all plantations carefully watched? Pará rubber is planted all over the country by all sorts of people, little patches of half a dozen trees here and there, native plantations which the owner perhaps hardly looks at once a week, and then only cursorily. Any one will see that a patch of trees may be infected, neglected, and form

A FOCUS FOR THE DISPERSAL OF SPORES

in every direction. One large-sized badly-infected tree could produce enough spores to thoroughly infect a large area. It is to this danger that I would call your attention. Rapid as is the development of the disease, and quickly fatal as it is, the loss could be minimised if it is attacked immediately on its appearance, but like all these pests, if allowed to gain head, it might prove unmanageable when thoroughly established, like the small flame easily extinguished at first soon becoming, if neglected, a vast conflagration. I would suggest that it would be advisable that a mycologist, or some one who is competent to detect this disease, should regularly inspect Pará rubber trees wherever cultivated, and especially the little lots planted by natives, from time to time, . . . and that he should be empowered to order the destruction and disinfection of diseased trees. The disease is one of considerable importance and might easily become very troublesome. At present it appears to be sporadic, occurring in little patches here and there, and by watching for it, it can be readily checked. In most cases I have seen it attack trees 2½ to 4 years old, and the death of the tops of these was clearly seen by the manager. The top infected should be cut well back, that is well below the dead part, and the cut disinfected with tar. . . —S. F. Press; August 22nd.

SELECTED CUTTINGS.

Some Consideration in the Treatment of Plant Diseases.

One of the most important considerations which enter into the treatment of plant diseases is the relation between the expense it involves and the return in additional profit which it is likely to yield. This relation is often dependent on several factors of a purely local nature, so that the correct solution of the problem, in any given instance, depends on useful co-operation between the planter and his advisers. It is with the object of indicating in what ways this co-operation is specially important that the following matters are brought under discussion.

When any crop is attacked by disease of a fungoid origin, the nature of such attack may be of two kinds: either it may be epidemic and destroy, or threaten to destroy, the whole crop in the course of a short space of time, or it may cause the steady loss of a certain percentage of the produce during a long period: that is, it may be endemic. In the second case, there is always to be taken into consideration the additional danger of such diseases becoming suddenly epidemic.

The general nature of the advice given by a plant pathologist, or mycologist, in dealing with disease falls under three heads. Firstly, total destruction of diseased plants; secondly, the application of remedial and preventive measures to diseased plants or to plants likely to become diseased; thirdly, permitting the disease to take its course unchecked. The first two kinds of advice may be given in dealing with either epidemic or endemic diseases. The third is only applicable in the case of such endemic diseases as do so little harm that the expense involved in checking them is not compensated for by the additional profits obtainable from the crop.

In the case of the sudden outbreak of an epidemic on any estate the best advice that can be given is frequently for the total destruction of the infected plants, as, although it necessarily involves a certain amount of loss yet if the trouble is treated at an early stage this loss is not serious in proportion to that which would be sustained if the whole crop was destroyed. In this case, the sacrifice of a portion of the crop is not only justified, but often absolutely necessary, in order to prevent the loss of the whole. Remedial, follow by preventive measures, or remedial measures alone, can only be recommended in such a case when the result of long experience has proved conclusively that these measures are adequate to prevent the spread of the disease.

The treatment of endemic disease is of a different nature. In this case there is often little risk of the total loss of a crop or even of the loss of so great a part of it as takes away all profit from the grower. Most frequently, the main object is to reduce the percentage of loss due to the disease to a minimum, and thus to increase the profits to the maximum obtainable in the conditions under consideration. Then it is that remedial and preventive measures become of the first importance. Total destruction can be but rarely recommended, because it certainly involves the loss of part of the crop, and possibly, that of part of the capital expended on removing dead trees and on replanting others which often give no return for five or six years; moreover diseases are apt to affect, to a greater or smaller extent, almost every tree or plant or any plantation where they occur. The position of the mycologist in this case would appear to be a very simple one. In reality this is not so. In recommending remedial and preventive measures, he has to consider if the expense involved will gain adequate compensation in the additional profits derivable from the treatment. If not, then all he can say is that the existing state of things must be permitted

to continue, and in so doing, he allows the planter to run the possible risk of the endemic disease becoming epidemic, and causing the loss of all his plants.

The conditions which determine if the expense involved in remedial measures is justified by the additional profits obtained are often governed by the interaction of numerous and somewhat delicate factors. Such are, for example, the general circumstances of climate, the fertility of the soil, its suitability to the crop grown, and the amount of co-operative effort to reduce the disease that is likely to occur in the neighbourhood under consideration.

In recommending remedial measures two other important factors must be taken in account, namely, the amount of capital available for carrying them out, and, if carried out, their cumulative effect on the suppression of the disease. Frequently, the execution of the best remedial measures in any given case, involves the outlay of a certain amount of capital, and where this is not available, less effective, though frequently much cheaper, measures must be recommended. Consequently, it often happens that two or three alternative sets of treatment have to be suggested, while the choice of that set which is most applicable in any case, is left to the person who is raising the crop.

In some instances, where there is little or no available capital, as in the case of small holders, all that can be suggested by the scientific adviser may be that the disease be permitted to exact an annual toll, as long as this toll does not involve all or the greater portion of the profits. On the other hand, those possessed of spare capital should bear in mind that the investment of it in thorough and reliable treatment of their crops will often yield a larger return of interest than the money could ever bring in if it was invested in ordinary securities the risk involved is necessarily greater. Further, money thus spent not only increases the yield in any given year, but, if the treatment is continued, earns as it were a higher rate of interest each year, until a steady maximum is reached, owing to the cumulative effect of the treatment on the suppression of the disease, which suppression continues until the loss due to the disease reaches the minimum that can be effected by that treatment under the given circumstances. . . .

It will probably be clear now, that it is not always an easy matter for a scientific adviser to make suggestions as to the best treatment for any given disease. In addition to the technical difficulties of his work, many considerations of a very varied nature must also be taken into account, and it is in dealing with these that the co-operation of the practical agriculturist is of the greatest service. Frequently, portions of the diseased material are submitted, for examination by the pathologist, which are forwarded almost without any word of explanation. No information is given with regard to field characters of the disease, its extent, and the general conditions which may effect it; and no hint is afforded as to the amount that the planter is prepared to expend in controlling it. When this is the case, the work of the mycologist is rendered considerably more difficult, and it can hardly be a matter for wonder that his advice is sometimes not directly suited to the requirements of the agriculturist. Too much emphasis cannot be laid on the importance of forwarding, with all specimens for examination, the fullest possible account of all circumstances, however trivial, that may shed any light on the problem, as in this way only can a full and sympathetic understanding of any given case be arrived at, by his advisers, which will enable the practical agriculturist to be in receipt of the best and most carefully considered recommendations.—*Agricultural News*.

The Planters' Chronicle.

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The International Rubber Exhibition, 1911.

It may interest Rubber planters in Southern India to learn that the Planters' Association of Malaya has resolved to secure a space of 2,806 sq. feet (122 ft. x 23 ft.) at the above Exhibition, the Organizing Secretary of which understands "that Brazil are going to make a mammoth show." A similar space has been reserved for Ceylon.

Ceylon Import Duty on Tea.

In its issue of the 7th instant the *Times of Ceylon* writes:—

"We have been many times of late requested to re-open the discussion, in our columns, on the Ceylon import duty on Indian tea. We have been assured by merchants in the Fort that views on this subject have changed and that the matter is regarded in a different light to formerly, as disclosed in discussions in the resolutions of the Chamber of Commerce and of the Planters' Association of Ceylon in support of the duty.

"We have no desire to shirk discussion of so important a question as this; and, accordingly, we publish to-day the first of the series of interviews with those interested in the tea trade. We would point out that the difficulty of the Home Government opposing preferential treatment of Indian tea has not apparently been considered by those who wish the import duty removed so far as India is concerned. Mr. Grant Cook is for making Ceylon an absolutely free port for tea, and we certainly do not find ourselves in agreement with him."

In the same and later issues the above paper gives reports of the interviews mentioned, remarking in an introductory note on the 8th instant:—"There is an almost general impression among those interested in the question—our representative has discovered in pursuing his inquiries—that before very long the matter of our import duty on Indian tea will again come up for consideration at the meetings of the Planters' Association and Chamber of Commerce. Interest in the question has been thoroughly aroused and, as before, there is a marked difference of opinion between the planters, producers and sellers on the one hand and the local buyers, blenders and shippers on the other.

The following are extracts from the reports of interviews:—

Sir STANLEY BOIS assumed a non-committal attitude. "It appears to me," he said, "to be a matter upon which I should prefer to await the views of others who are in closer touch with the tea trade, as there is no doubt that circumstances have changed somewhat since the question was last discussed. Although I then held it to be undesirable in the interests of

the reputation of Ceylon tea to remove the existing import duty, I should be quite open to conviction if any new facts were brought forward which tended to modify those views, and I should not like, therefore, to commit myself at this stage to a definite opinion either for or against the proposal."

The views of Mr. G. LIONEL COX, of Messrs. Carson & Co., were short, but to the point: "From a Ceylon proprietor's point of view," he said "I should be against the abolition of the import duty, but, on the other hand, if I were a buyer, I should be in favour of it. But, on the whole, we have a very nice little market here, and why should we take the risk of letting in other teas?"

Mr. A. J. GRANT COOK unhesitatingly expressed himself as being entirely in favour of the abolition of the import duty. He said: "I consider that we have such a splendid opportunity here that, if Indian tea could come in free, Colombo would become the principal distributing centre for the world. The shipping facilities enjoyed by Colombo are unsurpassed. At present, I can see no valid objection to the scheme. I cannot see who is to be injured in Ceylon; I cannot see how it can tend in any way but for the betterment of Ceylon if this duty is removed. Of course, the question arises 'Are you going to let in Java tea?' Personally, I should be quite in favour of it—Java tea, China tea, or any other tea could come here! They all pay a duty going into the United Kingdom.

"I should like to see this an absolutely free port for tea. I think it is quite on the cards that some of the Indian growers would send tea down here to be sold by auction. I think that is very likely, for there would be every inducement for them to do so.

"The only objection I have heard is offered by the Thirty Committee, who say they have spent much money in advertising pure Ceylon tea; but the fact remains that they have not persuaded the world's public to drink pure Ceylon tea! Therefore, if the public insist on Ceylon tea being blended with other teas, why should it not be blended in Colombo as well as anywhere else?

"Government won't lose anything by it. They get nothing now from the import duty on Indian tea because no Indian tea comes here: and they will gain materially in harbour dues if the duty is removed."

Mr. COPLAND MACKIE, Director of the Eastern Export Proprietary, Ltd., was doubtful, but, on the whole, against the abolition of the duty. "I don't see," he observed, "what advantage it would be for London blenders to bring their Indian, Java, and China tea here, which would entail double freights. Colombo is admittedly the worst climate in the world in which to empty out and blend tea, and I do not think that the leading English blenders would blend here in any quantity, but, of course, this is purely my own personal opinion.

"While I admit that the port, as a whole, would probably gain from the increased shipping, I do not think that it would bring any advantage to the growers of Ceylon, and it might possibly affect them injuriously unless very stringent regulations were made in regard to the marking of teas on re-export."

"As regards Australian buyers, I do not think it would be even thought of by Australian blenders, as there is no doubt that the Australian Government would instantly impose a duty on teas blended in Colombo, which would otherwise have afforded labour to a number of work people in Australia.

Mr. A. J. DENISON (partner, Messrs. Cumberbatch & Company) was emphatically against the abolition of the duty. "I act entirely for the sellers

of Ceylon produce," he said, "and I cannot see the advantage of bringing in other teas. We have a very high standard here now and where can we, as sellers, possibly benefit by bringing in inferior Indian and Java tea? . . . I have no doubt that it would add to the business of Colombo; but I am looking at it from the point of view of a seller."

Mr. I. W. TITOFF, of the Russian Trading Company, spoke in favour of the abolition of the import duty, principally because he wanted to get Travancore tea into the Ceylon market. "In Russia," he explained, "strong tea is very largely consumed, and it would be a considerable advantage to have Travancore tea here to blend with Ceylon tea, the leaf being much better manufactured in Travancore than in Ceylon. The blending of the two would give the flavour we want."

"We get some pure Ceylon tea in Russia, but usually it is blended with Indian and China tea. I hardly think, if the duty is removed, that Calcutta will send down here. We should, of course, get tea from Southern India, and possibly from Java, and I think it would be a very good thing if this could be brought about. The manufacture of Java tea has very greatly improved lately."

Mr. F. L. CLEMENTS (partner, Messrs. Cumberbatch & Company) had no liking for the proposal. "Our prices, at the present time, are good," he said, "and the removal of the duty, enabling Indian tea to come in free, might not affect us much, but should the times of 1900-1903 come back, when cheap and common teas were a drug in the market, I think it would do Ceylon more harm than good. . . . It might have the effect of increasing the trade of Colombo slightly by having these big blending houses out, but I don't see how they will manage to do their blending here."

"It is clear, however, that opposition to the proposal is waning."

Mr. R. H. WILLIAMS, Manager of Messrs. Dodwell & Co., Ltd., was emphatically in favour of the removal of the duty on British grown tea only. "It only wants pushing," he declared, "and it's bound to come. The abolition of the duty would have the effect, I am convinced, of opening up Colombo. It would bring out London firms, and would result, accordingly, in greater competition and give a fillip to Colombo trade generally. I believe it would make Colombo the biggest distributing market in the world for tea. The blending would be done here instead of at home, and labour being much cheaper, it would be done at a great saving. . . ."

"Personally, I should not be surprised if the duty were removed in the course of a few years. It only requires pushing, and it will come off. Of course in the meantime there is bound to be considerable opposition from the weighty London tea interests who commission accounts would correspondingly suffer as the trade was diverted from London."

The Hon. Mr. W. H. FIGG (partner, Messrs. Whittall & Company), was against the removal of the duty. "I see no reason to-day," he said, "to disagree with the decisions which have previously been arrived at in connection with this question. So far as I am aware, any new agitation which is started in order to get the duty removed is, with few exceptions, initiated by those who have no real stake in the Island, and who wish to further develop the packing and blending business in Colombo. . . ."

"In any case, if anything in the direction suggested is going to be done, I should only be willing to give preference to India, but doubt very much whether this so-called Free Trade Government would ever listen to such a proposal."

Scientific Officer's Papers.**XLI.—POTASSIC FERTILISERS.**

Potassium is one of the elements indispensable to plant life, and also to animal life; no cell can live in the absence of potash salts. It plays a part, not yet altogether understood, in the production of Carbohydrates, that is, bodies like sugar and starch. Hellriegel's experiments showed, for instance, that the amount of sugar in Beets stood in close relation to the amount of Potash supplied to them. The plant obtains the Carbon necessary to build up its wood and tissues from the Air, bodies like sugar and starch being first formed in the leaves through the medium of the green colouring matter, or Chlorophyll, in them, the sunlight supplying the necessary energy. This process is known as Assimilation, and it is this which potassium aids in some way.

Most crops remove considerable quantities of Potash from the soil, and any deficiency in this constituent seriously impedes their growth. The growth of Leguminous plants is very much promoted by the application of Potash salts, and the Rothamsted Experiments have also shown that Potash makes plants more resistant to attacks of fungoid diseases.

The Potash found in the soil has been derived from the slow decay of minerals in the rocks, chiefly of Felspars, (*P.C.*, Vol. V., p. 297) and it is fairly evenly distributed in both soil and subsoil, the latter containing generally a little more because it is not so thoroughly leached. Clay soils contain the most Potash, and light sandy soils the least as a rule. A soil should contain at least 0.01% of Potash soluble in 1% Citric Acid, but those which contain more than this often respond to an application of potassic fertilisers.

When Potash salts, like Muriate, Sulphate, and Nitrate, come into contact with the soil, a chemical reaction takes place; the chlorine sulphuric, or nitric acid, as the case may be, of the salt combines with the Calcium and other bases of the soil to form soluble salts which are gradually washed out into drains. The Potash, however, forms insoluble compounds with Silicates, and is thus retained by the soil and becomes gradually available to plants. This absorbent power is especially marked in the case of clay soils and those rich in humus. Of course it is not absolutely complete, but a very large proportion of the Potash added to such soils is retained by them.

Owing to this interaction between Potash and Calcium salts the latter are constantly being removed from the soil, and this may finally result in a loss of tilth, and Lime should in consequence find a place in any manurial system in which Potash takes a prominent part. As explained above, the presence of a certain amount of Lime is essential to the proper action of Potassic fertilisers. When the Lime content of the soil is naturally low, Muriate of Potash should not be used, as it removes Lime and makes matters worse; under these circumstances Sulphate of Potash should be used, as it does not remove lime to the same extent.

Potash salts can be mixed with Nitrogenous manures, and with Superphosphate, and even with Basic Slag, but the latter mixture should not be allowed to stand long before application. In this connection, however, it must be remembered that *Muriate of Potash must not be mixed with Sulphate of Ammonia*, or the latter will lose part of its Nitrogen.

In addition to Sulphate and Muriate, Ashes constitute a useful form of potassic fertiliser. Potash forms a large proportion of the ashes which remain when plants are burned, twigs and young boughs of shrubs and trees

containing the most. Dr. Lehmann found the following percentages of Potash in different kinds of ash :—

Wood ashes (mixed)	...	...	2'32 to 0'4.
Lantana ash	...	...	13'26
Bamboo ash	...	...	5'4

Lantana unfortunately yields only a small quantity of ash, about 2% according to Dr. Lehmann, but this ash contains a very large amount of Potash and is in consequence a valuable fertiliser.

Ashes should be protected from rain before they are applied, as the Potash in them is in a soluble form and soon washes out. They are so valuable that they should be conserved and made use of as much as possible, and the ashes from the cooly lines should be collected and added to the compost made from coffee pulp &c., or to the Stable manure pits. A system of making such Composts was described in Sc. O. Paper VIII. (P. C., Vol. IV., p. 281).

RUDOLPH D. ANSTEAD,

Planting Expert.

COVER PLANTS AS A SUBSTITUTE FOR CLEAN WEEDING.

Among the papers communicated to the International Congress of Tropical Agriculture and Colonial Development held at Brussels in May last was one by the late Mr. J. B. Carruthers, Assistant Director of Agriculture Trinidad, of which the following is an abstract :—

The clean weeding of estates as practised in the Tropics is a legacy from experience in temperate countries, and has given excellent results, so that planters are not naturally inclined to abandon it. There are, however, certain conditions obtaining in the Tropics, which render clean weeding disadvantageous. The chief of these are as follows :—(1) Denudation by tropical rain is severe on land, which is regularly weeded and consequently has its upper layers of soil in a loose and friable condition (2) The soil thus lost is rich in plant food, and though part of it may be recovered by an efficient drainage system, the recovered portion is not re-spread and consequently is of little value to the estate as a whole, (3) Clean weeded land dries and hardens in the sun so that the upper layers of the soil become inefficient for cultivation purposes, (4) The cost of clean weeding sometimes forms as much as 60 per cent. of the total cost of working an estate, and labour needed for other purposes has often to be diverted to this work.

These difficulties may be avoided by using cover plants to prevent the growth of grasses and weeds. Plants suitable for use in this way should have the following characteristics :—(1) They should shade the ground without producing an impermeable, matted surface, (2) they should remain green in drought, (3) they should be of sufficiently vigorous growth to prevent the growth of weeds, grasses, etc., (4) they should not grow more than 2 feet high so that they do not interfere with the crop. It is further an advantage that the plants should be leguminous, so that the soil in which they grow may become enriched in nitrogen by their aid. The following provisional list of suitable cover plants is suggested :—*Mimosa pudica*, *Tephrosia purpurea* or *T. candida*, *Crotalaria striata* or *C. incana*, *Abrus precatorius*, *Mucuna pruriens*, *Desmodium triflorum*, *Vigna* spp., *Passiflora foetida*, *Ipomœa batatas* (sweet potatoes).

DISTRICT PLANTERS' ASSOCIATIONS.**Shevaroy Planters' Association.**

Proceedings of the Annual General Meeting of the S. P. A. held in the Victoria Rooms, Yercaud, on 5th September 1910.

PRESENT :—Messrs. B. Cayley, F. Carey, R. A. Gilby, R. Gompertz, C. G. Lechler, W. I. Lechler, C. Rahm, W. Rahm, Revd.—Rochet, Messrs. F. D. Short, B. Short, C. K. Short, L. E. T. Short, and Ch. Dickens, (Hon. Secretary and Chairman).

I. The Notice calling the Meeting was taken as read.

II. (a) *Passing of Accounts*, (b) *Hon. Secretary's Report*, (c) *Delegate's Report*.

(a) The Accounts were audited, showing a balance in hand of Rs.82-6-10 up to end of August 1910.

(b) The Hon. Secretary having read his annual report—it was proposed by Mr. R. Gompertz, seconded by Mr. C. G. Lechler, and carried unanimously : "That the report be adopted and printed with the proceedings of this meeting."

(c) The Delegate read his report in connection with the late U.P.A.S.I. Meeting.

III. *The King Edward VII Memorial Fund*.—Referring to the District Tahsildar's letter dated 12th July 1910 to Hon. Secretary, S. P. A., it was proposed by Mr. B. Short, seconded by Mr. L. E. T. Short, and carried unanimously : "That he be informed that this Association is subscribing to the King Edward VII Memorial Fund and in the opinion of this Meeting the District Tahsildar should ask a leading resident of Yercaud (who is not a member of the Association) to convene a Public meeting for the purpose of his letter."

IV. Read letter dated 25th August 1910 from Mr. H. G. Nicholson to Hon. Secretary.

(a) Complaining of the bad state of the Yercaud to Craigmere Feeder Road.

(b) Excessive rates paid to labourers employed on the Salem Water-Works, Salem.

(c) Cart rates for transport of strappings, tails, floaters, &c., &c. That if a cart-man takes down 50 Bh. Dry Parch :—he should take down 60 Bh. Dry Strippings at the same rate.

(a). *Yercaud to Craigmere Feeder Road*.—Resolved that the attention of the Executive Engineer, Salem, be drawn to the deplorable state of this road, presumably, owing to the fact that a large quantity of loose earth was spread just before the rains commenced, and asking him kindly to arrange that in future repairs to the road be undertaken at such a time that the road may be in good order about the time planters require its use.

(b). *Excessive Rates*.—Proposed by Mr. C. G. Lechler, seconded by Mr. R. A. Gilby, and carried unanimously :

"That the Hon. Secretary be requested to address Mr. E. S. B. Stevenson, C. I. E., asking him to be so kind as to let this Association know how much work has been completed and how much more and what kind of work is still to be done in connection with the Salem Water-Works and also kindly to state what rates per man and woman are paid for above per day by either D. P. W. direct or by contractors."

(c). *Cart Rates*.—After a great deal of discussion on this subject it was proposed by Mr. B. Short, seconded by Mr. F. D. Short, and carried unanimously:

"That the question of cart rates and cart loads be postponed to a Special General Meeting."

V. *Forest Reserve*.—Read letter dated 29th August, 1910 from Mr. B. Short to Hon. Secretary reporting that he has heard that a large Forest Reserve is to be opened on the Shevaroyan and Bran-fill Hills.

Resolved:—"That the Hon. Secretary be requested to write to the Collector and District Magistrate, Salem, asking if it is true that the slopes comprising Shevaroyan and Bran-fill Hills are to be converted into a Forest Reserve in which part of lands held by planters is to be included."

VI. *Office-bearers*.—The following gentlemen were elected to serve on the Committee for the coming year:

Messrs: B. Cayley, C. G. Lechler, J. C. Large, S. M. Hight, C. Rahm, F. D. Short, Rev.—Rochet, Ch. Dickins (Honorary Secretary and Chairman).

VII. *Vote of Thanks*.—Proposed by Mr. R. Gompertz, seconded by Mr. B. Cayley and carried unanimously:

"That a vote of thanks be accorded to the Hon. Secretary for his past year's services, also for representing this Association at the late U.P.A.S.I. meeting and for his report."

VIII. *Read and recorded*.—Letter dated 12th January from Superintendent of Police, Salem.

Circular 30/10 dated 11th August.)
 " 31/10 ") From Secretary, U. P. A. S. I.

(Sd). CHAS. DICKINS, *Hon. Secy., S.P.A.*

Central Travancore Planters' Association.

Proceedings of an Extraordinary General Meeting held at Carady-goody Bungalow on Saturday, September 3rd, 1910.

PRESENT:—W. H. G. Leahy (Chairman), J. A. Richardson, C. W. Lacey, T. A. Vernon, J. H. Cantlay, T. A. Kinnond, F. Bissett, R. P. Roissier, H. C. Westaway (Hon. Sec.); by proxy, Messrs. B. Wolde, T. C. Forbes & C. G. Gordon; and visitors, Messrs. R. Harley and A. R. St. George.

The Chairman called upon the Honorary Secretary to read the notice calling the meeting, after which the minutes of the previous meeting were taken as read, and confirmed.

Correspondence.—Read letter from Superintendent, Cardamom Hills, dated 2-8-10, No. 2079. Resolved that Honorary Secretary do write to His Highness's Government pointing out the great hardships the residents were put to in having no Munsiff's Court in the District, and that they were led to believe that the Dewan, after his recent visit to the District, was in favour of such a Court being opened in Peermade.

Read letter dated 26th July from Chief Engineer. Resolved that the Honorary Secretary do write pointing out the disgraceful condition of the Sircar road from Mundakayam to Kumili.

Read letters from Messrs. Wolde & Parry & Co., re Planters' Benevolent Fund. Resolved that the Honorary Secretary do write and tender the Association's best thanks to Mr. Acworth and Messrs. Parry & Co. for their generous donations of Rs.500 and 150 respectively.

Read letters from District Board, Madura. Resolved that the Honorary Secretary do write and thank them for the information.

Read letter from the Secretary, U. P. A. S. I., No. 33/10, dated August 16th, 1910 re *Planters' Chronicle*. Proposed by Mr. Richardson and second-

ed by Mr. Cantlay :—" That the Hon'y. Secretary has standing instructions to order copies of the U. P. A. S. I. proceedings, and bound volumes of the *Planters' Chronicle* for every member of this Association, to be sent by V. P. P." Carried unanimously.

Read letter from Secretary, U. P. A. S. I., No. 30/10, dated 11-8-10, re " King Edward VII Memorial Fund." Proposed by Mr. Roissier and seconded by Mr. Kinmond :—" That the Honorary Secretary do circulate subscription list, and forward the amount to the Madras Committee." Carried unanimously. Rs.155 was promised in the room.

Revision of Breach of Contract Regulations.—Proposed by the Honorary Secretary and seconded by Mr. Roissier :—" That the Legislative Council Member be asked to use his discretion in the proposed revision of the Breach of Contract law." Carried unanimously.

Medical Scheme.—Chairman :—" Gentlemen, I have much pleasure in announcing that both Caradygoody and the Travancore Tea Estates Company have consented to join the scheme, provided that it is on the same lines as the resolution which was brought up at the last meeting by Mr. McArthur, but which he had to withdraw till he could receive definite instructions from his Directors. These he has now received (Hear ! Hear !!). Proposed by Mr. Richardson and seconded by Mr. Lacey :—" That an assessment of 8 annas per cultivated acre be levied to meet the expenses of the European Doctor Scheme, and that the dispensaries either contemplated, or at present existing (grant-in-aid or otherwise) are run as before, and have no connection with the European Doctor Scheme, except that they will be supervised by the Doctor." Carried unanimously.

Resolved that Messrs. Richardson and Forbes be added to the Committee.

Proposed by Mr. Richardson and seconded by Mr. Lacey :—" That Mr. Cantlay be elected Honorary Secretary of the Medical Fund." Carried unanimously.

With a vote of thanks to the Chair the Meeting closed.

(Sd.) H. C. WESTAWAY, *Hon. Secy.*

In some *Notes on Tapping Castilloa Rubber* which were submitted to the International Congress of Tropical Agricultural and Colonial Development by the late Mr. J. B. Carruthers, Assistant Director of Agriculture, Trinidad, it was remarked :—"The yield of rubber from *Hevea brasiliensis* trees, over five years old, tapped on the "herringbone" or "V" system may be taken as 1 lb. of dry rubber per annum, for each foot diameter of the tree, measured at 3 feet from the ground. In *Castilloa* trees, tapped by hatchets, chisels or axes or by the methods used for *Hevea*, the yield is much poorer and does not exceed 6 oz. per foot diameter, measured at 3 feet from the ground. The author considers that this smaller yield is due mainly to the lack of a system of tapping suited to *Castilloa*, and he has undertaken a series of experiments designed to discover a better system.

Experiments in pricking *Castilloa* trees, varying in diameter from 27 to 45 inches and in age from 7 to nearly 10 years, indicated that good results may be obtained in this way, and these trials are being continued. It was observed that *Castilloa* trees continued to yield latex for from 10 to 20 minutes after pricking, but that the period of flow could be lengthened to about 50 minutes by continuously spraying the pricked portion (10 x 10 inches in these trials) of the bark with water, and in this way the yield of rubber could be increased by from 20 to 40 per cent. The latex was collected by means of an unbleached calico "apron" of special form attached to the tree about 8 inches from the ground. A suitable "pricker" has yet to be devised for *Castilloa*, and the author is making experiments in this direction.

COFFEE AND RUBBER.

Coffea Robusta as a Catch Crop for Para Rubber.

BY DR. P. J. S. CRAMER, GOVERNMENT COFFEE EXPERT, JAVA.

Discovery of the Robusta Coffee and Importation in Java.—Under the name of *Coffea robusta* a new species of coffee from Africa was put on the market some time ago by a Brussels firm, l'Horticole Coloniale. It was discovered in the Congo State by a traveller of this firm, M. Luja. In the catalogue for 1900 it was for the first time described and offered for sale. For its vigorous growth, it was named *Coffea robusta*. This, however, is not a botanical name, as the description is far from complete. A comparison between the growing plants convinced me that robusta coffee is identical with *Coffea Laurentii*, a new coffee species, discovered in the Congo State by the Belgian explorer, Emile Laurent, and baptised after him by Professor de Wildeman, of the Brussels Botanical Garden, and probably the same as *Coffea canephora* var. *San kuruensis*. It must be understood that this robusta coffee (or *Coffea Laurentii*) is a true species differing as much from the other known coffee species (Arabian and Liberian coffee) as those differ among themselves. It is well known that in some places the one will do very well where the other is a failure.

When robusta coffee was first offered for sale several estates in Java ordered young plants in Wardian cases from Brussels. Towards the end of 1900 the new species was planted on several estates in the east and in the centre of the island. At first the trees were considered as a mere curiosity, but when, some two years later, they came into full bearing, and people saw the great quantity of berry they produced, this opinion changed. In 1905 several plantations were made on a larger scale; but at that time seed was still too rare and too expensive to permit of great extension. Latterly the price has come down from fl. 10 per katti (about 12 shillings per lb.) to fl. 2 per katti (about 2s. 6d. per lb.).

Since 1907 the cultivation of robusta coffee in Java has been largely extended. The area planted with the new species in the planting season 1907-1908 may be estimated at some 5,000 acres; in 1908-1909 this surface was increased by 20,000-30,000 acres; last year the extension was probably even more. On the other hand, the old coffee species are no longer planted. In 1908-1909 there were planted in the Malang district 11,000-13,000 acres of robusta, 50-60 acres of Liberian coffee and no Arabian coffee at all. These figures show sufficiently the rapid growth in popularity of robusta coffee among Java planters.

Climate suitable for Robusta Coffee.—Experience in Java proves that robusta may be planted from sea level up to 3,000 feet elevation. The elevation has of course an influence upon the development of the tree. In low, hot and damp districts the growth is quicker than in high altitudes. In the wet districts of the East of Java the best plantations of robusta coffee may be seen. The elevation above sea level of these estates varies from 1,000 to 1,500 feet, and the soil consists of a deep, rich mould.

Robusta thrives best under a rather high and equally distributed rainfall, but it can also resist periods of drought. In the Southern Mountains near Malang, robusta successfully withstood a dry period of nearly four months. The trees suffered a little by the drought, but quickly recovered after the first rains. I never heard in Java of robusta dying for want of rain. It should be borne in mind, however, that in Java coffee is always planted under shade trees. Pará rubber will not have the same influence. Some rows of coffee will be too much shaded by the rubber, other rows will be quite exposed to the sun, and in the wintering period the rubber will give

no shade at all. As shade for coffee, we always use in Java trees spreading an equally distributed light shade. In Sumatra I have seen coffee grown without shade.

Wind has a very bad effect on robusta. In windy places, on the top of a very exposed hill, for instance, it is useless to plant robusta unless protected by a wind belt.

Soils Suitable for Robusta Coffee.—Robusta coffee has a strong root development. Even in the seedling beds it may be observed that the roots are far more developed than with Liberian coffee. With trees put out in the field the roots spread out much farther than the branches, especially in the top soil. When in one-year-old plantations the soil between the rows is opened, the white roots of the coffee may be seen everywhere.

The strong development of the root system requires a loose, free soil, which allows an easy passing of the water and which does not oppose any obstacle to the growing root.

On free, sandy soils of volcanic nature, as those found on Goenoeng Kloef, in Java, robusta grows very quickly, and the same is the case on the rich mouldy soiled of the Banjoewangi district in the East of Java. On the stiff clay soils, as found in the West of Java, the growth is far slower and poorer. I thought the same would be the case on the soils consisting of white clay which occasionally may be met near the sea coast of East Sumatra, but I am informed that robusta fields about one year old up till now do quite well on this soil.

Robusta as a Catch Crop.—A satisfactory catch crop must accord with the following requirements :—

1. The catch crop must not do any damage to the Pará rubber.
2. The catch crop must come into full bearing as soon as possible.
3. The culture must be easy, without any special difficulty requiring specially skilled labour; the preparation of the crop must not require any expensive machinery.

If the last of these conditions is not fulfilled, as may be the case with cassava or lemon grass, the manager of the estate and his assistants are so occupied by the difficulties of preparing the product of the catch crop for the market that they cannot pay attention enough to the principal crop, the rubber.

Among the different species of coffee, robusta is without any doubt the best fitted for being grown as a catch crop by its precocity. Two years after planting it produces a small crop, and at the end of the third year a full crop, under proper conditions, of about 15 cwt. per acre may be expected.

The most important point is, that the rubber must not be handicapped by the interplanting of the coffee. Statistics are not available on this point, but indications would seem to show that the rubber will not suffer in the least from the coffee.

In Sumatra most of the Pará was at first planted between the rows of old Liberian coffee; in the first and second year the rubber is handicapped by the neighbourhood of the coffee, but as soon as the rubber trees emerge and spread their branches above the coffee shrubs their rate of growth is similar to that of rubber on clean soil. In one case I obtained figures which permit a comparison. Two adjoining fields were planted with Pará rubber and in quite the same soil. In one field the rubber was planted between the rows of one-year-old Liberian coffee, in the other the rubber trees stand on clean soil: The first plantation was 19 months old when I measured the trees; the other, without coffee, was 24 months old.

Of each field 50 trees were measured at 3 feet above the soil, and with these figures the average girth for each plot was calculated. The average girth for the Pará without coffee was 18.89 cm., and for the *Hevea* with coffee, 15.87 cm. The trees of the first plot were 17 per cent. thicker than those of the second plot. This difference is just the same as the difference in age, so that we may expect that if the trees had been planted at the same time there would have been no difference at all in the average girth.

The Seedling Beds of Robusta Coffee.—We will not insist here upon the important question of selection. In Java carefully selected seeds may be obtained; the best thing for a planter who intends to plant robusta coffee extensively to do will be to go himself to Java and to choose the fields from which he wants the seed.

The seedling beds of robusta need much care. They must be covered by a dense roof of grass; in Java the leaves of lalang are generally used for this purpose, tied upon ropes of bamboo. This roof is gradually thinned out when the seedlings grow older, in order to accustom the plants to the sunlight before they are planted out in the field. It is preferable to put the seeds not too close together; a distance of 6 inches will be found convenient. The plants can then be kept longer in the nursery and planted out when they have reached a fair size, four or five pairs of leaves, for instance. It would be still better to keep the seedlings during nine months in the nursery and to plant them then as stumps. Reckoning the time from the planting out a stump will certainly produce ripe fruit earlier than a plant put in the field as a small seedling; and with a catch crop we must do what we can to get the crop as soon as possible, because we will have to cut it out again relatively soon. If the plants are to be kept for nine months on the seedling beds, a convenient distance will be one foot. In this case it is advisable to sow the seeds at first very thickly on a germinating bed and to put out the germinated seeds—what we call in Java “soldiers”—or the young seedlings with only one pair of leaves on the seedling beds. If the robusta must be put in the field quickly these methods take too much time. Robusta coffee can be transplanted at all ages; in Sumatra I have seen a plantation planted with germinated seeds, and in the F. M. S. even a field planted with robusta seeds at stake. The trees were only six months old, and in the axils of the leaves on the lower branches flower buds could be found. With no other coffee species would such a method of planting have been a success.

Distance and Planting out in the Field.—If the plants are put in the field as young seedlings, it will be advisable to plant them with the clod; stumps may be planted without the adhering earth, right in the same way as Pará stumps are put in the field, only the roots must not be pruned so thoroughly; it is sufficient to shorten the tap root a little; do not cut the lateral roots. When the planting hole is filled the roots must be spread upon the loose earth, covered with the remaining earth, and then the loose soil is pressed slightly with the hand.

Robusta coffee forms a shrub of a somewhat smaller size than Liberian coffee; the distances between the plants must be a little shorter. When robusta is planted in Java as a permanent crop, the distance varies from 7 by 8 or 8 by 8 to 10 by 10; or the plants are put 12 by 12 with one in the centre. If it is planted as a catch crop, there will be advantage in planting more densely, in order to reach a fair production sooner. The distances depend upon the distances between the Pará rubber. As a base we may take as the shortest distance between the coffee plants 6 feet, and as the shortest distance between the rubber and the coffee 7 feet. In cases where the rubber is planted in widely distanced rows, it will be advisable to plant no

coffee in the rubber rows as it might hinder the overlook of the rubber, and to plant the rubber rows in the direction East-West, in order to get the largest amount of light between the rows upon the coffee. . . .

Topping, Pruning and Upkeep of a Young Plantation.—Coffee robusta has a strong tendency to form in the first years only primary branches. It is therefore advisable to compel the tree to take a more dense development by topping the stem. If the top is cut off the primary branches form more secondary twigs, and these are not inferior to the primary ones as to the production of fruit. Another way to induce the shrub to a stronger development of secondary twigs is to expose it while young to the bare light. A comparison between shrubs planted in shade and those planted without protection from the sunlight shows at once that the former have a comparatively slender appearance and far less secondary twigs than the latter ones.

There is still another reason for topping. If the trees are not topped, the stem grows too high. A robusta tree of about six years may be 20 feet high, or even more. Trees of this size are a nuisance when the berries must be picked; ladders must be used, and after the picking many branches are broken. Trees topped at 8 feet do not require the use of ladders; the branches charged with fruit hang down and the berries can be gathered easily. This point is of great importance, as in the latter case women may be used for the picking, while if the work must be done on ladders only men will do it. A comparison between topped and non-topped trees proves that the difference in yield is none, or only very small. The only disadvantage of topping is that at the top of the stem many suckers arise, which must be cut off regularly.

The only pruning required by the trees is the removing of the suckers. It must be done not only with older, topped trees, but also in young plantations. In fields planted only some months suckers may be found at the base of the stems, often the result of wounds caused by the coolies cutting into the bark when the soil is cleaned with some native knife or hoe.

The upkeep of a robusta plantation is certainly cheaper than of a field with Liberian coffee. Epiphytic weeds do not grow upon robusta stems. The branch system is so dense that no light can reach the soil just under the tree; the upkeep may be even cheaper than the clean weeding of a rubber field. Robusta coffee does not require a large number of supplies as is occasionally the case with Liberian coffee. The upkeep must be the same for robusta as for Pará rubber; both require clean weeding. If a field grows "dirty," the coffee will not die, but the leaves grow yellow and no crop will be produced. I have seen extraordinary examples showing that if such a field is clean weeded again the coffee will recover in a couple of months.

The growth of the robusta coffee is quicker and more vigorous than that of Liberian coffee. We have already cited instances. . . . After one year and a half the trees can be tapped at 8 feet. If grown without shade, perhaps some months later. After the tapping the trees will develop more in breadth and reach in three years their full size.

Flowering and Fruiting: Yields.—The first flowering is to be observed one year after the putting out in a field. Plantations in Sumatra were reported recently to flower 8 months after planting; they began with the forming of sterile, star-shaped blossoms after 7 months; one month afterwards the first normal blossoms appeared. The time required for the ripening of the fruit after the flowering may be estimated at about nine months, so that the first ripe berries may be gathered within two years.

The flowers appear the whole year through. In this respect robusta is similar to Liberian coffee. The weather has only a slight influence upon the flowering; even when it takes place during a rain, most of the flowers will set fruit. In very wet districts, however, heavy rain storms are reported to damage the flowers of young shrubs. Although *Coffea robusta* flowers the whole year through, the climate is not without any influence upon the crop. In dry months more flowers are formed than in the wet season, and therefore there will be also for some months an increase of the crop. The ripe berries remain on the branches about a month, so it is sufficient to come round with the picking in one month.

Some figures regarding the yield of plantations in Java follow here. All these plantations are planted under shade trees and grown as a permanent crop; the only plantation without shade known to me produced, 3.4 years old, 17 cwt. per acre.

Plot A. Planted in the beginning of 1904, 12 by 12 feet, with a tree in the centre.

Year.	Age of the Plantation.	Yield.
1905	2nd	1'5 cwt. per acre.
1906	3rd	5'5 " "
1907	4th	17 " "
1908	5th	15 " "
1909	6th	21-24 " "

Plot B. Planted in the beginning of 1905, 10 by 10 feet, but of each 9 coffee trees one is removed and a nutmeg tree planted in place of it.

Year.	Age of the Plantation.	Yield.
1906	2nd	1'5 cwt. per acre.
1907	3rd	7 " "
1908	4th	17 " "
1909	5th	17 " "

For a small plantation of 56 trees, imported in a Wardian case and planted in the end of 1900, the following average yields per tree were found:—

1902	...	A little.
1903	...	1'4 lb. per tree.
1904	...	2'8 lb. "
1905	...	4'2 lb. "
1906	...	5'5 lb. "
1907	...	5'5 lb. "
1908	...	5'5 lb. "
1909	...	5'5 lb. "

I have visited this plantation at several times. The trees look quite thrifty and do not show up till now the slightest indication of decay for old age.

In some cases extraordinary productions were obtained. Before citing them I would insist upon the fact that figures like these are not to be considered as average ones, but only as a proof what robusta coffee can produce under exceptionally favourable circumstances. A plantation planted 6 by 6 feet, under a shade of dadap (*Erythrina*) and Hevea, produced in the third year not less than 30 cwt. per acre, and the year afterwards only a little less, nearly 29 cwt. per acre. Certainly from no other coffee species were yields like this obtained, even in the time of the highest prosperity of coffee culture in Java.

When robusta is grown as a catch crop the yield per acre will be less than in the cases cited above, because there are less trees on an acre, and after some years the rubber will shade too densely the rows of coffee trees next to it. I think a fair estimate for the case is as follows:—

First year after planting the first blossoming appears.

Second year a small crop is obtained of about 1—2 cwt. per acre.

Third year a full crop may be obtained of 14 cwt. per acre.

Fourth year the same yield may be expected.

Fifth year the shade becomes too dense and only the rows of coffee in the middle will still produce. The crop may still be some 7 cwt.

After five years the coffee will have to be cut out as the rubber comes in bearing and because the shade becomes too dense to get a fair crop.

It should be borne in mind that the above estimates refer only to cases in which the rubber is planted at a proper distance from the coffee, at least 7 feet, and the conditions of soil and climate are suitable for the catch crop.

Curing of the Crop for the Market and Quality of the Product.

The berries are much smaller than those of Liberian coffee. They form on the knots of the branches dense clusters. The largest number I counted in one knod was 83. Often the berries form a sort of clump of crowded fruits pressed together. The picking of the crop will not be expensive, as the abundance of fruit makes it easy to the coolie to fill his basket. In a plantation of 300 acres, three years old, the picking (done by women) was ready over at one or two o'clock, when the pickers, on an average, had gathered one pikul of fruit. A great advantage is that the skin and the pulp of the fruit are thin, so that four pikuls of fruit give one pikul of market coffee, while with Liberian coffee we need almost ten pikuls of fruit to get the same amount of one pikul of market coffee. In this respect the robusta coffee is even more advantageous than Arabian coffee, with which species the proportion between ripe fruit and market coffee may be estimated at 5:1 or 6:1. It will be understood that the high proportion of market coffee got out of the fruit means a cheap picking, for the picking is paid after the amount of ripe fruit gathered. If, for instance, the gathering of one pikul of fruit 50 cents (35 dollar cents) is paid, the cost of gathering will be for one pikul market coffee with *Coffea robusta*, fl. 2 (1'440 dol.), while with Liberian coffee it will be fl. 5 (3'50 dol.)

The skin of the berries of *Coffea robusta* is thin and easy to remove. In Java the Lidgerwood pulper is generally used for this purpose; the force required for the removing of the skin is far less than with berries of Liberian coffee, which possess a hard, tough skin.

The pulped beans are fermented for 36 hours, washed and dried. It is necessary to have a drying house and to expose the beans at once to a rather high temperature—about 60° Centigrade—in order to produce a rapid shrivelling of the silver skin, which only can be removed if the coffee has been dried at once at a high temperature. If the beans are dried in the sun the removing of the silver skin will offer some difficulties. The best way to get rid of it is to dry the beans thoroughly at first and to hull them; then they are soaked a moment in water and dried again. The silver skin which remained on the beans after the first drying will be removed by the hulling after this second drying, but the colour will suffer a little from the soaking.

The quality of well cured robusta coffee is almost similar to that of average Arabian coffee; the shape of the beans is somewhat different, as robusta is broader and more convex. The size is almost the same. Well cured robusta has a blue-green colour, like good Arabian coffee. The market price is about 10 per cent. under the price for Java coffee and Liberian coffee. This disadvantage is largely balanced by the greater cheapness in producing.—*India Rubber Journal*.

(To be Continued.)

CORRESPONDENCE.**National Bank of India, Limited.**

Madras, 10th September, 1910.

Dear Sir,—I have the pleasure to inform you that I have received advice by wire from my Head Office in London that the net profits of the Bank for the Half-year ended 30th June last including the sum brought forward amount to about £227,549.

The Directors have declared an interim dividend at the rate of 12% per annum, carrying forward to next account about £179,549.

W. J. K. HEGARTY,

Manager.

Labour.**NEW SOURCES OF SUPPLY.**

Dear Sir,—In his letter to the *Madras Mail* which appeared in the issue of that paper dated the 6th instant, Mr. Pittcock makes mention of the Committee appointed at the last U.P.A.S.I. Meeting to enquire into the question of recruiting coolies from New Districts, of which Committee I was made a member. I write to report progress :—

So far, I have not communicated with, nor have I received any communication from, other Members of the Committee. It has seemed to me to be necessary that the Committee should first be in a position to know exactly from what parts coolies are at present obtained. I have doubts about the willingness of planters to supply this information, judging from the action of some District Associations in refusing to reply to the very reasonable questions asked by the last Labour Committee of the U.P.A.S.I. Even if we get this information, it will be difficult to realise the position without a Map of the country. I am pretty well acquainted with the Geography of South India, and when I hear of coolies coming from such and such a place, I can generally locate the position in my mind's eye, but it is not to be expected that every planter can do the same. A Map is therefore necessary, and I have tried to buy one that would suit the purpose, but have failed. I am therefore driven to the necessity of making one myself, and after finishing only half a dozen districts I am beginning to find I have bitten off a chunk bigger than I can chew. However, some day I hope to finish it. I would then like to have it reproduced so that the Honorary Secretary of each Association may be supplied with one, with a request to paint or shade in those places on which his district depend for labour, and return it to me. If this is done, the total result of all the Maps can be transferred to a "Mamma" Map which I shall keep in my possession, and only on completion of this should the Committee meet to deliberate. That is what is in my mind at present, and it may not come off in the way I want, but I hope it will. I would like to add that I am not sanguine of finding any district in South India which is entirely free from recruiters, but there may be parts of districts, or places from which only a few coolies are obtained. I include Ceylon and the Straits in my operations of course. Besides the case where the Kanan Devan district failed some years ago with Cuddappah coolies, which was mentioned by Mr. Mead at the last U. P. A. S. I. meeting, I know of another planting district, where a planter took the trouble to learn Telugu at a time of life when New Languages are not easy of acquirement

to every one, and who proceeded to Bellary and got to his Estate some 170 coolies at the cost of Rs.22 per head plus a lawsuit with an Agent who swindled him, and the result was that the coolies' debts to the Estate increased every month, so that he was glad to send them away and confess the attempt a failure after a year or so. It is all very fine to say they were not the right class of cooly. If the planter I allude to, does not know the right class of cooly, then none of us do. We can only tell after actual trial, and after risking a total loss of say Rs.25 to Rs.30 per cooly, and a certain loss of a great deal of this money; adding to our labour force say 10 % of the number of new coolies recruited, with a fair chance of this 10 % increasing in the distant future.

I mention these two concrete cases of genuine attempts to tap new districts, and both have been failures. Can anyone point to a successful venture in recent years? In the issue of the *Madras Times* of the 6th instant also, there appears a letter signed "Veteran" which is concluded by asking the question whether it is possible for Government to stop outside recruiting by guaranteeing employment in India. According to my lights, this is not possible. Free men in a free country must be allowed to settle for themselves the question as to whether they shall emigrate or not. What Government should do is to see that they are not humbugged into Emigrating, and that promises made to Emigrants shall be kept.

Has any one noticed the flippant way in which Sir John Anderson, G. C. M. G., the Governor of the Strait Settlements, alludes to the Tamil coolies who immigrate from South India? On the 17th August at the Singapore Agricultural Show he spoke as follows :—

"The Tamil cooly is very often a very sickly person, the victim of famine and without even the most rudimentary ideas on sanitation. From many points of view he is a most undesirable person and in some parts of the Peninsula, as you know, he has developed a most convenient habit of dying rather numerously." ["Convenient" may be a misprint for "inconvenient"—A. Ff. M.]

See *Madras Mail*, Saturday evening, August 27th.

I suppose it would not be etiquette for the Madras Government to draw the attention of Emigrants to this statement from so high an authority even if they added, as Sir John Anderson did, that in consequence, it was decided that the indenture system should be abolished in the Federated Malay Straits, so that the survivors can take their shattered systems off the Estates, by giving one month's notice. But, query? Can they find the means to get home? In India a cooly can walk home, in the Straits he leaves one Estate to find refuge on another!

Srivilliputtur, 8-9-1910.

AYLMER FF. MARTIN.

The King Edward Memorial.

The Hon. Secretary, Central Travancore Planters' Association, writes, under date September 10 :—"At an extraordinary general meeting of this Association held on the 3rd instant it was proposed by Mr. Roissier and seconded by Mr. Kinmond that the Honorary Secretary do circulate a subscription list for "King Edward VII Memorial Fund" and forward the amount to the Madras Committee. Carried unanimously. Rs.155 was promised in the room."

The Planters' Chronicle.

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(INCORPORATED.)

Publications.

Both the U. P. A. S. I. Book of Proceedings, 1910, and the first half-yearly volume (No. V/1) of *The Planters' Chronicle* for the current year have been issued from the press, and orders received have been executed. Applications for any copies required should be kindly made as soon as possible.

PRICES :—Book of Proceedings	...	...	Re.1-8-0,
<i>Planters' Chronicle</i>	...	...	Rs.2-0-0,

per V. P. P., postal charges included.

There has been delay over the preparation of the Revised Rules of the S. I. P. B. F., but it is hoped that they will be ready within a few days.

The report of the U. P. A. Labour Committee is now in the press, and orders should be registered early. Price— 8 annas per copy, postage included.

The Scientific Officer.

Mr. R. D. Anstead is at Mundakayam and proceeds thence to Peermade. The date of his return to head-quarters is not yet settled.

Attur Ghat Road.

With reference to the resolution on the above subject passed at the Annual Meeting last month, the President of the Madura District Board writes that the Board "cannot find money to put into repair the Attur Ghat Road and that the question as to the future of the Road is now before Government."

Valgay Valley Railway.

In reply to a letter communicating copy of the resolution on the above subject that was adopted at the Annual Meeting last month, the President of the Madura District Board writes, under date 12th instant :—

"With reference to your letter of the 22nd August 1910, I have the honour to inform you that until the revised contract with the South Indian Railway comes into force nothing can be done in the way of settlements of terms."

The International Rubber Exhibition, 1911.

Under date the 2nd instant Messrs. Rowe, White and Co., Ltd., of London, write as follows :—

"We thank you for your favour of the 9th ultimo informing us that your Association at their Annual Meeting have decided to have

a South Indian display at the above exhibition, that Mr. J. A. Richardson was appointed delegate and asking us to act for the Association in the matter of securing space, &c. This we shall be most happy to do and when we receive notices of the Exhibition from the promoters, we shall do our best to make the Southern Indian Section a complete success."

Messrs. Peirce, Leslie & Co., Ltd., have kindly promised to undertake, free of commission, the work of forwarding exhibits from the South Indian districts.

Mr. Bernard Cayley has been good enough to take upon himself the task of writing the Shevaroy section of the booklet that is to be printed in connection with the South Indian display.

Malabar Coast Planters' Association.

The above is the name by which the Cochin and North Travancore Planters' Association will be known in future.

Ceylon Import Duty on Tea.

The following are further extracts from opinions reported in the *Times of Ceylon* :—

Mr. T. C. TCHOKOFF (partner in the firm of Messrs. Stcherbatchoff, Tchokoff & Co.), strongly favoured the abolition of the import duty, and said it should be done without any further delay. "It will never do any harm to the Ceylon planters," he declared, "and it would have the effect of increasing the trade of the port and the general interests of Colombo, and Ceylon generally, to an enormous extent. I see absolutely no reason why the duty should not be removed—and removed at once.

"I know from my own experience that, as soon as Ceylon tea arrives in Russia, it is blended with Indian and China tea, and exactly the same thing, I hear, applies to London; so why should Colombo not have the benefit of the blending being done here?"

Mr. H. E. DAY, (of the firm of Francis F. Street), favoured the abolition of the duty. "It would," he remarked, "undoubtedly have the effect of increasing business, especially with countries such as Russia and America. Buyers would then be able to do the blending in Colombo, thus saving a good deal of labour.

"On the other hand," said Mr. Day, "I think there should be a fixed standard of tea, and nothing below this standard should be allowed into Ceylon."

Mr. A. PELLY FRY (buyer, Messrs. Carson & Co.), was opposed to the removal of the duty. "One must talk more or less, perhaps, from a personal point of view as regards the different classes of trade," he remarked, "but, as I said years ago, the whole thing seems to hinge on the question whether it's going to be an advantage or otherwise to the producer. Of course, if it's not going to do him any harm, then there is no reason why Indian tea should not be allowed in duty free. But pure Ceylon tea has been a pass-word for years from the wholesale merchants' point of view, and it's just a question whether the merchants in Australia, America, Canada, Russia, &c., would not be somewhat sceptical as to whether they were receiving the genuine article, as far as the bulk trade was concerned."

THE PLANTERS' LIBRARY.**1.—Rubber Cultivation in Burma.**

In issue of September 17, 1910, an advertisement was published, calling attention to "Notes on the Cultivation of Rubber in Burma." This little book is from the pen of Mr. J. W. Ryan, Extra Deputy Conservator of Forests and Manager of the Government Rubber Plantations at Mergui. The author has availed himself of some well known works of reference and of a list of Rubber-yielding plants found in Burma which was compiled for Government by Mr. F. B. Manson, late Conservator of Forests in that province. The book is written with special reference to Burma, but will be found useful in India also, for it is comprehensive in scope and at the same time simple in style. From the opening out of land with Pará Rubber, the author passes to weeding, pruning, thinning, manuring, mulching and tapping, then to diseases of Rubber. He then writes briefly about other rubber-yielding plants in Burma, including Balata, *Funtumia elastica*, *Ficus elastica*, Castilloa and Ceará. In appendices some figures are given regarding the yield obtained from Pará Rubber Trees in the Experimental Gardens at Mergui; the rules regarding grants and leases of land in Lower Burma for Rubber cultivation are given; also, the list of rubber-yielding plants in Lower Burma already mentioned. A few illustrations help to explain portions of the text.

It will be seen from the above remarks that the "notes" under reference mainly constitute a brief treatise on the cultivation of Pará Rubber in Burma, sections relating to other matters being of minor importance. The author states that the Government Plantation consists of 1,898 acres and in addition about 2,400 acres have been alienated for Rubber in the Mergui District, 2,011 acres of which are taken up by two Companies who have started planting, the one on King Island and the other at Maliwun, while the balance consists of small holdings owned by Burmans and Chinamen. Planting on a large scale has also been commenced in the Tavoy and Shwegyin Districts and at Rangoon and smaller areas opened out in other districts in Burma, the growth of the young plants is reported as satisfactory and judging from the results obtained at the Experimental Gardens, Mergui, both the growth of the trees and the yields obtained are an assurance that rubber can be profitably grown in Burma.

He remarks:—"The climate of Lower Burma differs from that of Malay and Ceylon in that it has two distinct seasons, a rainy and a dry one, which probably accounts for the somewhat slower growth of Hevea compared with that in the Straits, where growing conditions obtain throughout the year.

"The opinion held formerly that Hevea would only thrive on more or less flat land at sea level and with a temperature that did not fall below 60° has not been borne out by experience and it has been proved that the plant will thrive under a wide range of conditions.

"The growth of Hevea is slower at the higher elevations but this slower growth probably results in a superior product, it being noticed at the recent Rubber Exhibition at Ceylon that the rubber grown at the higher elevations was very strong and that most of the winning estates were situated in the interior of the Island at medium elevation.

"The minimum rainfall required would depend on the climate in which the Hevea is grown. At Mergui, at sea level, the average annual temperature is 80° and the average annual rainfall is 165 inches. . . . The humidity of the atmosphere is also a point to be taken into consideration in connection with the rainfall, a humid atmosphere compensating for a low rainfall the two sometimes being found in conjunction."

Of the Permanent Crops that may be grown with Rubber it is stated that Cocoa and Liberian Coffee are known to do well in Burma, and that Tea would probably do well. It is doubtful, however, if the use of the word "permanent" in this connection is justifiable, and if the cultivation of tea in Burma would ever become an important industry, because of climatic conditions.

Both crotalaria and groundnuts are used as green manures. Mr. Ryan remarks:—"It is impracticable to attempt growing catch crops which require much cultivation over large areas except in those favoured localities where labour is cheap and plentiful, where it is not it would perhaps be preferable to plant close and thin out when required. The principal object aimed at is to cover the ground as quickly as possible and so keep down the expense of weeding, which forms the largest item of expenditure in the first 5 years. The rubber obtained from the trees removed will more than repay the cost of growing them.

He adds:—"Ceará rubber might be grown with Hevea as a catch crop, it yields a marketable rubber at an early age. The twigs and leaves, unlike those of Hevea, yield a rubber of good quality, and it has been suggested that this species might be utilized as an annual crop. No catch crops can be grown with profit when the roots of the Hevea take complete possession of the soil."

This last is a remark that appear to dispose of the question of "permanent crops" to be grown with Pará Rubber.

2.—*Aigrettes and Birdskins.*

This is placed in "The Planters' Library" by the courtesy of the author of the book, Mr. H. Hamel Smith, Editor of *Tropical Life*. It is not of special interest to the planter *quá* planter. As a sportsman or as a unit in the great community of civilised beings he may like to read another man's statement about "Aigrettes and Birdskins: The Truth about their Collection and their Export." He may, also, be attracted by the "foreword" written by Sir J. D. Rees, K. C. I. E., C. V. O., M.-P.

Mr. Hamel Smith asserts that his book proves that:

"Judged by the standard that prevails in England (the most humane and considerate country with regard to animals and birds), the methods employed in the collection of birdskins and feathers in the Tropics are not cruel." Further, "in the case of individual birds, or centres of origin, should there appear to be danger of the birds becoming rare, much less extinct, then the suggestions advanced by the trade are the true and only practical methods for adequately protecting them. The chief of these is the establishment of a close season at the centre of origin."

"In the face of these two facts there is," observes the author, "no reason whatever, taking the Tropics as a whole, to prohibit the exportation of birdskins and feathers to Europe."

The book has not been written to show that the people of Great Britain are unfeeling, "but to prove that the natives abroad are not the cruel, thoughtless monsters that a few agitators, who have the Press willing to help them on this side, would have us believe."

Sir J. D. Rees is careful to state that he "must not be taken to accept the opinions expressed in this book." He makes the point that isolated action by England in regard to the prevention of importation of the plumage of birds, would not have any appreciable effect, and would probably merely cause a transfer of the millinery business to the Continent and an aggravation of unemployment, "without in the least protecting the birds from slaughter."

DISTRICT PLANTERS' ASSOCIATIONS.**Malabar Coast Planters' Association.***Minutes of a Meeting held at Trichur, September 10th, 1910.*

PRESENT :—Messrs. E. F. Barber (Chairman), F. W. Winterbotham, T. C. Forbes, R. De Roos Norman, W. E. Forbes, H. B. Kirk, E. Lord, W. D. Tait, Campbell Hunt, G. R. R. Parker, R. G. De Roos Norman, R. E. De Roos Norman, W. S. Scofield, H. C. Plowden, & R. L. Gudgeon (Honorary Secretary).

Honorary Members.—Messrs. R. D. Anstead (Scientific Officer), E. H. Johnstone (Conservator of Forests, Cochin State), H. Gill (Acting Chief Engineer, Cochin State).

Visitors.—Mr. Stewart and Captain Lampton.

The First Business was the Chairman's Address.—In which he pointed out that although the following have not gone through the Association but through the local planters, we had managed to get the contract for Palapilly to Edathingal padom road, and the Palapilly Hospital had actually been opened.

Delegate's Report was passed.

Scientific Officer spoke a few words on the experimental plots, Rubber Seed, Oil & Poonac and proposed Pest Act.

Experiment Plots—The following Committee was formed to see to this matter: Messrs. R. L. Gudgeon, R. De Roos Norman, H. C. Plowden, E. Lord, H. B. Kirk, and Campbell Hunt.

The Subscriptions to the Local "King Edward Memorial Fund."—Resolved that the Agents of various Estates be approached and individual subscription be collected and that this Association do promise the Dewan of Cochin financial support for any memorial which he may think fit to erect in the memory of King Edward in Cochin State.

Rubber Seed Oil.—Resolved that Mr. Anstead is heartily thanked for suggesting the question of Rubber seed oil and poonac and that this matter be at once considered by the Scientific Committee. **Proposed Pest Act** was left on the Agenda until the committee appointed by the U. P. A. S. I. had sent in their report.

Subscriptions & Exhibits to the International Rubber Exhibition, 1911.—That with reference to the International Rubber Exhibition of 1911, the Honorary Secretary of this Association do circulate all other Associations interested in Rubber with a view to collecting the views of all, and bringing them into line on this matter.

Subscriptions to the S. I. P. B. F.—Resolved voluntary subscriptions to be collected.

Planters' Chronicle.—The Members inform the Honorary Secretary the number of books required.

Lady Amphthill Nurses' Institute.—That the Association do join the Lady Amphthill Nurses' Institute as an Association and that all members voluntarily subscribe through the Honorary Secretary at the usual rates.

Gun Law.—Withdrawn.

Alteration of Association's Name.—Resolved that this Association be called the Malabar Coast Planters' Association.

Rubber Theft Act.—This was left on the agenda until the Committee appointed by the U. P. A. S. I. do report.

(Signed) R. L. GUDGEON, *Hon. Secy.*

Wynaad Planters' Association.

*Proceedings of a General Meeting held at Meppadi Club on
September 14th, 1910.*

PRESENT:—Messrs. Ewart, W. R. McKenzie, Mead, Powell, Trollope, West and C. E. Abbott (Honorary Secretary).

Mr. Powell in the Chair.

1607. *The Proceedings of last Meeting* were confirmed.

1608. *Roads.*—Read Honorary Secretary's letter, dated July 16th, to District Board Engineer regarding spreading of last year's collection of metal on Vellera Mulla Road and Road 38; and reply, dated July 19th, stating that the work would be undertaken when the weather was suitable.

Vellera Mulla Road.—Proposed by Mr. McKenzie: "That the attention of the District Board Engineer be drawn to the deplorable state of deterioration of the Vellera Mulla Road. Very little metal is being collected, and in the meanwhile the ruts are being filled with earth and sandstone and as side drains are choked the rain water is scouring the metal laid down in former years." Seconded by Mr. Ewart, and carried.

Road 35 B.—Mr. West complained of the state of the bridges on this road. Except the new bridge at mile 24 they are quite unsafe for horses. The ferro-concrete bridge at the foot of Wrights Hill is incomplete and the diversion is in a very bad condition. Mr. Mead confirmed this statement. Honorary Secretary was instructed to ask the District Board Engineer to look into the state of these roads.

1609. *Non-Service of Warrants.*—Read letter 1356 dated August 17th, from District Superintendent of Police, North Malabar, pointing out that the 4 warrants against Chinnaswamy mentioned in last Proceedings had been sent to the Coimbatore Police not to the Malabar Police.

This is noted. But no complaint was made against the Police in Malabar in this case. Mr. West stated that he took out a warrant on June 15th against Narayan Maistry, of Valluvanaad. A month later, as there was no result, he applied to the Vayitri Magistrate, who said the Warrant had not been returned, and that he was enquiring into the matter. Subsequently one of his Maistries had a letter from the accused dated August 31st from his village. This was forwarded to the Magistrate. Meanwhile Mr. West sent his agent to point out the accused to the local Police. The Agent returned on September 8th, and stated that Narayan is in his village but that no warrant had been received by the Police there, so he could not get the man arrested. The Honorary Secretary was instructed to ask the District Superintendent of Police, South Malabar, what had become of the warrant.

1610. *The U. P. A. S. I. Meeting.*—Honorary Secretary read

THE DELEGATE'S REPORT.

It is usual for your representative at Bangalore to supplement the account of the U. P. A. S. I. Meeting in the Madras papers by a report on matters of interest to his own Association. I hoped to have presented a joint report, but Mr. Mead wished me to write it myself. I take this opportunity of thanking him for all the help he gave me throughout the Meeting, which lasted 5 entire days.

King Edward VII All India Memorial.—The Hon'ble Mr. Hamilton suggested that the U. P. A. S. A. I. should raise funds to subscribe to this object. It was pointed out that Committees existed in all Districts to collect subscriptions for it, and that many planters had already subscribed. The question was finally referred to District Associations.

Pepper Vine Disease.—It is hoped that Members who are carrying out the suggested experiments will send in their reports as soon as possible.

Cattle Disease.—A resolution was passed thanking Government for the remedial measures it has undertaken and suggesting that steps ought to be taken to ensure the burial of carcasses of animals dying of Anthrax and rinderpest along main roads.

The number of annually reported deaths from rinderpest in Malabar alone is enormous, and we know that there must be quite as many more that are not reported. With the ever increasing demand for transport in Wynaad the matter is a very serious one for us.

Act I of 1903.—A resolution was unanimously carried which requires 30 days previous notice to be given before this subject can be discussed at U. P. A. S. I. meetings. If no such notice is given it will not appear on the Agenda paper.

Labour Matters.—The report of the Labour Committee appointed in 1908 was rejected last year, and the Members were not even thanked for the trouble they had taken in the interests of the Planting Community. This year their recommendations were adopted and have been submitted to Government. If Government approve, the cooly who is about to emigrate will at any rate know exactly what his conditions of service are; and the proposed regulations are the same as those prescribed for coolies engaged under Act I.

A Committee, of which Mr. Mead is a member, was appointed to acquire information about new sources of labour supply; this is an important subject, and it is to be hoped the enquiry will be of assistance to all of us.

With reference to the non-service of warrants a resolution was passed asking for the police force to be increased in Coimbatore and Mysore. We also asked for facilities for the arrest of coolies absconding from British to Native Territory and *vice versa*.

Bonus on Green Tea.—A resolution was carried asking the Cess Committee to allot funds for a bonus of 6 pies per lb. on 4 million lbs. of green tea.

Our representative on the Tea Cess Committee, Mr. Romilly, has written strongly in support of our request, and it is hoped that the Committee will agree with him. The resolution was supported by all the Tea districts in South India except the Nilgiris.

Mr. Barber declared that Messrs. Harrisons & Crosfield intend to open a green tea finishing factory in South India whether the bonus is granted or not, and can quite well afford to do so; that the price of green tea in Ceylon, where there is no bonus, is very high, and that it is quite unnecessary to subsidise such a flourishing industry. Now Messrs. Harrisons & Crosfield have distinctly stated that they do not intend to start their factory unless the bonus is granted; and that if it is not granted they intend to start in Java. They are doubtless quite well enough off to start without the bonus; but they have not become so by throwing away business advantages. All through Mr. Barber's remarks there was the assumption that Messrs. Harrisons & Crosfield only contemplate exporting green tea from their own estates. This is not so. Their point is that unless the bonus is given they will not be able to offer rates to outsiders that will induce them to put up green tea machinery. Besides, Mr. Barber overlooked the fact that there was a bonus paid in Ceylon when the green tea industry was started.

Pest Act.—The Meeting expressed a desire that the Planting Member should interview Government with a view to having a Pest Act passed. One of your Delegates protested in Committee that we might not like a Pest Act quite as much as we thought we should if we got it. The question

is a very large one, and until we see the draft of the proposed Act it is difficult to judge how it would suit us. Such legislation has proved successful in other countries.

Laboratory for Scientific Officer.—This subject was discussed chiefly in Committee. The Meeting decided that a laboratory must be provided for Mr. Anstead. We promised to put the matter before the next Meeting of this Association. There are at present 18 subscribers to the fund; the total contributions are Rs.675 a year, and to be on the safe side we have only guaranteed Rs.630. Of the Rs.675, no less than Rs.500 is subscribed in four names. It is hoped that some of the smaller subscribers may see their way to pay more this year. What this Association is asked to do is to raise an extra Rs.260 this year to pay for setting up the Laboratory, and Rs.100 a year subsequently for upkeep.

Coffee Cess.—Government has called for further information, and the Director of Statistics complains that the returns sent in are often incomplete, and that many planters do not send them in at all.

We can help our friends in Coorg and Mysore, who are very anxious to get the Cess established, by filling in the forms you have all received recently. Managers of Estates that have been entirely replanted with tea should write on the form that this is the case, and return it to the Tahsildar, which will prevent the impression that information is being refused.

It may be worth mentioning that a planter who has any coffee left is bound by law to fill in the form that is sent in in duplicate for the information of the Police.

The report was ordered to be printed. Mr. Trollope proposed a vote of thanks to Mr. Mead and Mr. Abbott for their services. Seconded by Mr. McKenzie, and carried unanimously.

1611. *Poodapardy Post Bag.*—Read correspondence between Superintendent of Post Offices, West Coast Division, and Honorary Secretary.

The Post Master General has been addressed with a view to have the bag introduced at an early date.

Members are asked to note (1) that only articles addressed to C. Changaren or to his care will be enclosed in the bag; (2) that registered letters and value payable articles will be delayed, as in the first instance only the receipts will be enclosed in the bag and only delivered—entirely at the addressee's risk—when the receipts are returned signed; and (3) that unpaid articles will not be delivered at all, but will be treated as refused and sent to the Dead Letter Office.

It may be remarked that this subject, (which it is hoped is now settled) has given the Superintendent of Post Offices and the Honorary Secretary a good deal of trouble; and that from a letter forwarded for perusal by Mr. Ricketts, it would appear that it was mostly C. Changaren's fault that the Post Office at Poodapardy was closed.

1612. *Scientific Officer's Laboratory.*—Read correspondence. This matter is referred to in delegate's report.

1613. *Experimental Committees.*—Attention was called to the para. in the *Planters' Chronicle* of August 13th. The consideration of the subject was deferred till next meeting.

1614. *Timber on Darkhast Land.*—Read letter from Mr. Raitt enquiring what the procedure is when there is no bid for the timber at the auction. Honorary Secretary was instructed to enquire of the Divisional officer at Manantoddy, and to write to Mr. Raitt.

1615. *Recruiting and Emigration.*—Mr. Mead read a translation of an advertisement by the Ceylon Labour Commissioner published in the *Ceylon Times* of September 8th, 1910 about the conditions of Recruiting.

The Honorary Secretary was instructed to forward this to the Secretary, U. P. A. S. I., asking him to enquire from the Secretary, Ceylon Planters' Association, if these statements are correct, and if this advertisement is being made use of in South India.

1616. *Voting and Subscription*.—Mr. Mead gave notice that he proposed to bring forward a resolution on this subject at a special meeting to be held on the same day as the General Meeting of the Association in October.

A vote of thanks to the chair terminated the proceedings.

(Signed) S. H. POWELL, *Chairman*.

(„) C. E. ABBOTT, *Hon. Secy*.

“Max” writes in *Capital* :—

“The most significant item in the report of the Indian Tea Cess Committee, published last week, is the total failure to stimulate the Manufacture of compressed tea. The London Branch of the Indian Tea Association suggested it as a means of popularising the use of Indian tea in India, and the Indian Tea Cess Committee catching at a straw offered a bonus of 9 pies per lb. on a million lbs. to be sold locally in the year ending 31st March, 1910. Not a single pie of that bonus was claimed, so it is fair to assume that the manufacture was not attempted. It is stated that the cause of the failure was the lack of proper machinery, but having heard that an efficient machine has since been put on the market, the Cess Committee have allotted for the current year a sum of Rs.30,000 for the payment of a bonus at the same rate as last year.

“I feel pretty certain that most of that money will be still in the coffers of the Committee, when they make up their accounts next year. I do not believe that Tea bricks will ever be in any greater demand than Messrs. Yule & Co.'s packets; on the contrary I have reason to think that they will not be so acceptable. The lower class native whom it is intended to reach is naturally suspicious, and it will take much persuasive eloquence to convince him that the compress is composed of pure tea and nothing else. *Kya boltha re? Anglice* “Whom are you getting at?” will be the invariable comment of nine out of ten to whom the *modi* tries to sell the new fangled tablet, and the manufacturer will find that the *modi* has no patience with such customers. Better far from his point of view is to sell the black leaf with an odd kissmiss to give it the flavour so beloved of the drinkers of *gurram cha*. I never thought much of this suggestion of tea bricks in India. They are all very well for the nomads of Tibet and Siberia, but the Indian who drinks tea can boast a domestic economy which would not offend the industrious housewife at home.

“Tea, even of the lowest grade, as an every-day article of diet, is much too dear for the Indian agricultural labourer; the town artisan, and better paid operative, may be able to afford it, and it is only amongst these classes that any large expansion of local sales can be looked for. The worst of it is very few know how to brew tea so that it will not taste like poison. If they could get it passably well made they would buy several cups readily. This is the experience of Bombay, where the Iranee Parsees have risen to affluence chiefly by the sale of brewed tea. If the Indian Tea Cess Committee could enlist the services of some Iranees and set them up in all large industrial centres, I think there would soon be a considerable expansion of local consumption. Such an enterprise would be much more profitable than a wild scheme of selling bricks to people who would not know what use to make of them.”

COFFEE AND RUBBER

Coffea Robusta as a Catch Crop for Para Rubber.

By DR. P. J. S. CRAMER, GOVERNMENT COFFEE EXPERT, JAVA.

[Concluded.]

The cost of a store for the curing of the crop of an estate of 600 acres may be estimated at 20,000 or 30,000 fl. (£2,500). If robusta is grown as a catch crop, the store may be built on such a plan that it can afterwards be turned into a rubber store. The drying house, steam engine and the buildings are needed also for the rubber curing, so that the expenses must not be all put on the account for the coffee. The costs of the picking and curing, including the transport to the harbour, are estimated for estates in Java at 6-7 fl. (10-12 shillings).

The opinion of different coffee brokers was rather favourable to robusta coffee. It was classed under good Java coffee and above Santos. For roasting, the beans must be well done; they roast very equally, and lose less in weight by roasting than other coffees.

DISEASES AND INSECTS ATTACKING ROBUSTA COFFEE.

Up to the present robusta is fairly free from serious diseases. The only dangerous insect pest is the "boeck" (*Xyleborus coffea*, Wurth), a small beetle which bores holes in the branches. It was studied and described by Dr. Wurth, of the Experimental Station in Salatiza (Java). If the plague is still local, it may be cut out by a careful removing and burning of all attacked branches. If it is spread through the whole plantation it is better to leave it to itself. No tree will be killed by the pest, and even badly attacked branches will heal by the forming of a callus filling up the abandoned holes of the beetle; but many branches, weakened by the holes, will break down if charged with fruit. After some time Tachneumonids parasites will appear and keep down the beetles. I have seen a plantation badly attacked by *Xyleborus* and still producing a crop of 15 cwt. per acre. If the trees are topped and well provided with secondary twigs, they overcome an attack of the beetle without great damage.

The most serious fungoid disease is the djamoer oepas (*Corticium javanicum*, Zimmermann). The fungus lives on the under surface of the branches and on the stem; the bark dies out, and the branch or attacked part of the stem will die. Such trees should be cut down. The remaining stump easily develops a sucker, which will form a new stem. The principal danger of the *Corticium* fungus is that it attacks also *Hevea* branches. Dr. Bernard, Chief of the Experiment Station for Tea, at Buitenzorg, succeeded in infecting sound Pará rubber with the disease from the coffee. It will always be necessary to look out for the presence of the *Corticium* in the coffee in order to be able to cut it out before it spreads.

Hemileia vastatrix, the well-known leaf disease of Arabian and Liberian coffee, attacks robusta slightly. The new species is certainly not quite immune against the leaf disease, but at present robusta coffee does not suffer from it practically. Perhaps it will adapt, we might say acclimatise, itself upon the new coffee, but up till now there is not yet any indication of it, and we may expect that for the first ten or twenty years the coffee is still quite safe.

The root disease, which attacks Pará rubber often so badly, does not live upon living coffee roots, and in this respect there is no danger.—*India Rubber Journal*.

RUBBER.**The Henaratgoda Experiments of 1905-6.**

BY T. PETCH.

As is well known, tapping experiments were carried out on the old Hevea trees at Henaratgoda during 1905-6. At the time of the Rubber Exhibition they were described to some extent, and various interim figures were made known. But no discussion of the complete results was ever published. The final total yields were recorded in the R. B. G. report for 1906, but the figures were not analysed. Wright gives brief deductions in his "Hevea Brasiliensis" (Ed. 2), but these are based on incomplete results, and the figures are accepted without question.

The objects of the experiments were briefly as follows :—

- (1) To determine the yield of rubber from different parts of the stem.
- (2) To determine the relative value of different methods of tapping.
- (3) To determine the yield obtainable by tapping at different intervals.
- (4) To determine the relation between yield and climatic conditions.
- (5) Experiments in "feeding the latex tubes in order to increase the growth in cortex."

In "Science Progress" January, 1910, Parkin gives as established facts three results which are practically identical with Wright's conclusions. He states :—

(1) "Interesting experiments as to yield have been carried out by the Ceylon Botanic Gardens Department on the original Henaratgoda trees. These bring out clearly the great rubber-producing capacity of the basal-6 ft. of trunk, and the small yield afforded by the higher parts."

(2) "The full spiral, of all methods of tapping, yields the largest quantity of rubber in a given time."

(3) "The experience of planters and others has since shown that two days is, as a rule, the best interval between successive tappings, but some estates tap every day with good returns."

It must be remembered that the Henaratgoda trees differ considerably in age and size. For the purpose of these experiments they were divided into groups; and we must assume that they were grouped in such a way that the groups of one experiment were composed of trees approximately equal in size. It would have been of value if the girths of the trees had been stated, but this detail is omitted. Further, the trees of the different experiments were tapped at different times and by different methods. It is impossible, therefore, to draw any valid conclusions by selecting for comparison groups of trees which formed part of different experiments. We are restricted to the trees which were originally selected as comparable, and which were tapped in the same way or at the same time. It is only by ignoring this precaution that Parkin can arrive at the first result quoted.

EXPERIMENT 1.**TO DETERMINE THE YIELD OF RUBBER FROM
DIFFERENT PARTS OF THE STEM.**

Wright's deduction from this experiment is identical with Parkin's. But it is formed on figures which only deal with from one-third to one-tenth of the total tappings. The total number of tappings in the various groups which were experimented upon were 92, 95, 94, 93, and 84. Yet Wright's conclusions are based on 39, 16, 16, 23, and 8 tappings respec-

tively. Even then the yields for those tappings do not support his conclusions, and he only obtains his results by calculating the yield per unit of bark excised. This method of calculation is quite fallacious, since it assumes that the quantity of rubber obtained is proportional to the area of bark excised. The fallacy is widespread, and calculations of yields have recently been published which were obtained by tapping a small area of bark, and multiplying the result by the number representing the ratio of the total area of the stem to the area of bark tapped! It only requires a slight consideration to show that this method is wrong. If cooly A cuts off a strip one-sixth of an inch broad, in the same time that cooly B cuts off only one-twelfth of an inch, A does not get twice as much rubber as B. If however, A cuts off his sixth in two days tapping, he may get twice the amount that B obtains by cutting off his twelfth in one day's tapping. Thus the amount of bark excised is no standard by which to estimate the yield, except in so far as it indicates the duration of the tapping period. To make the bark to last as long as possible is a sound principle, but to calculate yields per unit of bark excised when the strips excised per tapping vary in breadth from one-sixteenth to one-quarter of an inch is merely juggling with figures.*

The trees of this experiment were all tapped by the full herringbone with cuts 1 ft., apart. They consisted of the following groups:—

		No of trees.		Tapped from.
C	...	25	...	base to 5 ft. 6
M	...	2	...	6 .. 16 ..
N	...	2	...	10 .. 20 ..
O	...	2	...	20 .. 30 ..
L	...	1	...	base .. 30 ..
W	...	2	...	.. .. 55 ..

The final results are as follows:—

C.	M.	N.	O.	L.	W.
Number of tappings.					
92	95	94	94	93	84
Yield per tree in lbs.					
3	8'7	12'2	8'7	14'5	15

Tapping the basal 5 feet 6 in. gives 3 lbs. of rubber per tree; with less than twice the length of trunk, 6-16 ft., the yield is nearly three times as great, and the same is true for the length, 20-30 ft.; from 10 to 20 ft., less than twice the length tapped in group C, the yield is more than four times as great. Only in the last groups is there any falling off. When the length tapped is increased about $5\frac{1}{2}$ times, the yield is less than 5-fold, and when the length is increased nine times, the yield is only 5-fold.

But in the last case the tappings are fewer. These results certainly do not bring out the superior producing capacity of the basal 6 ft.

The figures given in the pages of the "T. A.," the Annual Reports, etc., enable us to divide up the experiments into three periods, *viz.*, September, 1905, to February, 1906, February, 1906, to April, 1906, and April, 1906, to September, 1906. From this we find that while C was tapped fairly regularly, twice per week, the remaining groups were tapped at odd intervals. Thus we have the following numbers of tappings:—

C.	M.	N.	O.	L.	W.
First tapping period.					
39	16	16	16	23	8
Second tapping period.					
18	29	28	28	24	29
Third tapping period.					
35	50	50	50	46	47

In the first twenty weeks, C is tapped regularly twice per week, but three of the other groups are tapped less than once per week, and W is only tapped once in two and a half weeks. In the second tapping period, C is again tapped regularly, but the other groups are tapped three or more times per week. The third period suffers in the way. Evidently all the groups

except C were "rushed" in order to bring the total number of tappings up to the standard, and as this was done especially in the second period which includes the dry season, the yield suffers in comparison with C. Further, the more frequent tapping, since the total number of tappings are about equal, reduces the yield of the other groups compared with C. Everything here is in favour of group C, and yet the figures do not prove it the best. The yield of C. is, however, quite abnormal, as will be shown below.

For those who wish to adopt Wright's calculations as to the yield per unit of bark excised, the following analysis of his figures will be useful. In ground C. 9,750 cuts remove $7,348\frac{1}{2}$ sq. inches of bark, or 0.75 sq. inches per cut; in ground M, 640 cuts remove $796\frac{1}{2}$ sq. inches, or 1.25 sq. inches per cut; in group N, 640 cuts remove $1,472\frac{1}{2}$ sq. inches or 2.3 sq. inches per cut; in group O, 640 cuts remove $1,424\frac{1}{2}$ sq. inches, or 2.25 sq. inches per cut; in group L, 1,380 cuts remove 1,666 sq. inches or 1.2 sq. inches per cut; and in group W, 1,600 cuts remove 2,726 sq. inches or 1.7 sq. inches per cut. There is evidently something wrong about these figures, From the fact that the trees diminish in girth upwards, it would be expected that the amount excised per cut would diminish as the higher parts of the tree were tapped. But apart from this, if we take the average length of the cut as ten inches, then the strips removed per cut in groups N and O must have been nearly a quarter of an inch wide. The calculations given are based on the assumption that every tapping was done by paring, but as we are told that the bark was removed by paring only when the yield of later obtained by pricking was considered too small, the parings must have been about double this width.

The results of such an experiment as this would be of considerable theoretical importance, though they might not be of direct use practically. But it would have been preferable to have adopted a system of tapping equal lengths of stem at varying heights instead of altering both the length tapped and its position on the stem. 'Even then it is doubtful whether any accurate deduction could be obtained' unless the latex from each cut were collected separately.

As the experiment stands, it appears to prove that the greatest yield is obtained by tapping at about one-quarter the height of the tree from the base.

Various theories could be based on this result, but unfortunately it is vitiated (a) by the irregular tapping, and (b) by the abnormal yield of group C.

EXPERIMENT 2.

TO DETERMINE THE RELATIVE VALUE OF DIFFERENT METHODS OF TAPPING.

Three groups of trees were selected, *viz.*, A, B and C. Each group contained 25 trees, and all were tapped by the base to 5 ft. 6 ins. A was tapped by the full spiral, B by the half spiral, and C by the full herring-bone. The total number of tappings and the total yield in lbs. up to the end of each of the three periods into which the experiment can be divided are :—

A.	B.	C.
First period, September.—February.	First period, September.—February.	First period, September.—February.
37	41	39
50½ lbs.	35½ lbs.	47 5-16 lbs.
First and Second period, September.—April.	First and Second period, September.—April.	First and Second period, September.—April.
57	60	57
71 9-32 lbs.	46½	72 1-16 lbs.
Total results, September.—September.	Total results, September.—September.	Total results, September.—September.
91	93	92
82 31-16 lbs.	62½ lbs.	75 lbs.

It will be noted that although these trees are supposed to have been tapped regularly twice per week from beginning to the end of the experiment, the tappings were actually irregular. In the first period A loses four tappings compared with B, and two compared with C. In the second period, A gains one on B, and two on C; therefore A must have been tapped more than twice per week, or B and C must have been neglected. In the third tapping period C gains one on A, and two on B. Needless to say, in a comparative experiment of this kind, all the trees should have been tapped at the same time, even if a small number had been taken. If the trees are tapped on different days, climatic differences influence the results.

From the results at the end of the first period Wright states (Ed. 2, p. 96) that the maximum amount of rubber per tree is obtained by the full spiral. But on page 99, he gives the yields for the first and second period, which show that his statement was incorrect at the time it was published, since the full herringbone has then yielded the greatest quantity for the same number of tappings. However, the final figures which were not available until September, agree with those of the first period and support his conclusion.

Analysis of the figures, however, throws some doubt on the results arrived at. Working out the yield per tree tapping, we have the following figures (in ounces) :—

A.	B.	C.
	First period.	
0'88	0'55	0'78
	Second period.	
0'65	0'40	0'88
	Third period.	
0'22	0'30	0'05

For the first 37 tappings, A yields '88 ounces per tree per tapping; for the next twenty tappings it yields '65 ounces per tree per tapping, and for the last 34 tappings it yields '22 ounces per tree per tapping. B follows a similar course. But C after yielding '78 ounces per tree per tapping for 39 tappings, rises to '88 ounces per tree per tapping for the next 18 tappings, and then falls to '05 ounces per tree per tapping for the last 35 tappings. Such a result is quite anomalous; but, unfortunately, it is obtained in experiments 2 and 3 in just the two groups which have the most important bearing upon the point under experiment. As it stands, this result is inexplicable. The rise in the second period cannot be attributed to the effect of wound response, since it follows 39 tappings. Nor can the low yield of the last 35 tappings be put down to exhaustion; for the total number of tappings is only 92, the trees were only tapped twice per week, and only 3 to 4 inches of bark had been removed (Wright, T. A., December, 1906). Nor is it to be attributed to the individual peculiarity of the trees, for it is not the yield of on one tree but the average of 25.

To tap 25 trees, 15 to 20 years old, 35 times, *i.e.*, (for 17 weeks), and obtain only 3 lbs. of rubber must constitute a record. But it seems fairly evident that the figures for C. are questionable. If they are correct, then the full herringbone is the most exhaustive method of tapping, for after 57 tappings the trees yield practically nothing.

Wright concludes that the full spiral is the best method to adopt in thinning out estates which are too thickly planted, since it removes the maximum quantity of bark in a given time. But it does not follow, even if we accept the results quoted above, that it yields the greatest amount of rubber. In the experiments quoted, the full spiral yielded 82 3/16 of rubber, while the full herringbone yielded 75 lbs. But the full spiral tapped right round the tree while the herringbone dealt only with one side (Wright, T. A., December, 1906). It would be possible, therefore, if it were desired to injure the tree, to put another herringbone, perhaps smaller, on the other side; and a small yield from the second herringbone would suffice

to make that method the better. It may be noted that, as appears further in experiment 3, the total yields per tree of A, B and C are remarkably low in comparison with the other groups.

EXPERIMENT 3.

TO DETERMINE THE YIELD OBTAINABLE BY TAPPING AT DIFFERENT INTERVALS.

Four groups of trees were selected for this experiment, and another (A) was subsequently added. All were tapped by the full spiral, up to 5 ft. or 5 ft. 6". From the figures it would appear that the trees of group A differed considerably from the remainder. The groups were :—

	Number of trees.	Tapped.
D
E
A
F
G

In D and E Sundays are not reckoned, so that the trees were tapped six times and three times per week respectively. The results to September, 1909, are :—

	No. of tappings.	Yield per tree in lbs.
D
E
A
F
G

F appears to have missed one tapping, while E and A each received one extra.

These figures apparently prove most conclusively that tapping every alternate day yields more in a given time than tapping every day. As a rule, it is considered that alternate day tapping halves the labour, but gives less rubber than every day tapping, the gain being in the labour per lb. of rubber obtained. But in this case, not only is the labour halved, but the yield per tapping is more than doubled. Nothing could be more conclusive until the figures are analysed.

Calculating the yield per tree per tapping (in ounces) we find that D gave '65 oz; E, 1'47 oz; A, '58 oz; F, 1'38 oz; and G, '91 oz. "G, may be left out, as the group was only tapped eleven times and there could be very little "wound response;" practically each tapping was an independent tapping; the last four tappings, however, show a yield per tapping nearly four times as great as the first seven. The point which requires explanation here is the yield of group A (25 trees). The yield per tapping is more than double that in the every day tapping and so is the yield in the weekly tapping. Even the yield in monthly tapping is greater. But the yield per tapping for three-day-tapping is quite out of the series, and is even less than that for daily tapping! The only possible explanation would seem to be that the trees of group A were not comparable with those of the other groups. That it is not a question of "wound response" is shown by the yield of group F.

Dividing up the yields according to the three periods as before, we obtain the following, the first line giving the number of tappings in each period and the second the yield per tree tapping in ounces :—

D.	E.	A.	F.
	September—February.		
112	56	37	18
0'88 oz.	1'49 oz.	0'88 oz.	162 oz.
	February—April.		
56	27	20	10
0'67 oz.	2'78 oz.	0'65 oz.	1'29 oz.
	April—September.		
102	35	34	16
0'39 oz.	0'79 oz.	0'24 oz.	1'29 oz.

In group D there is a regular decrease as tapping proceeds. In group A there is a similar decrease, but though the figures for A and D are practically equal in the first two periods, A shows a much bigger drop in the third period, although it had been tapped only one-third the number of times. F shows a drop in the second period but, probably because the number of tappings is small, the yield per tapping in the third period does not decrease further. But E, which provides the conclusion of the experiment, does not fall in with these series. In the first period its yield is less than twice that of D, but in the second period it jumps to more than five times that of D, to fall again to about twice in the third period. If this is the result of the smaller number of tappings, why does it not occur in group A? If it is a result of the fact that the ante "wound response" tappings form a greater proportion of the tappings of the first period in E than in D, why does it not occur still more markedly in F?

EXPERIMENTS 4 AND 5.

The figures published are insufficient to admit of any conclusions being formed in experiment 4, and it is doubtful whether the necessary data were ever obtained. Experiment 5 does not seem to have been carried out.

From the foregoing it is evident that deductions which have been based on Experiment 1 certainly do not follow from the result of that experiment; and further that although the final figures experiment 2 and 3, support the conclusions published by Wright and Parkin, yet analysis shows that they contain so many anomalies that they cannot be relied on. The propositions which these authors assert may be quite true; but they cannot be deduced safely from the Henaratgoda results. On the whole, the latter give the impression that the experiments were planned on so large a scale that adequate control was impossible.—*Tropical Agriculturist*.

"Rex" writes in *Capital* :—

"Visits to Eastbourne, Bournemouth, Cheltenham and to several friends in London have brought to my notice that China tea is being extensively thrust upon customers by the grocers, and puffing advertisement-paragraphs appear frequently in the daily papers setting forth the certificates of medical practitioners, that China tea contains less tannin and is a more wholesome beverage than Indian or Ceylon tea. Consequently I find that most of the tea I am asked to partake of at my friends' houses has that nasty flavour of dirty straw, which is the characteristic of the average China leaf exported to Europe. I suggest that the Indian Tea Association should look into this, and urge the London Tea Association to take steps to refute the damaging advertisements and push the consumption of Indian leaf."

"Contrary to expectation," says the *Grocer*, "the total shipments of tea from Java during 1909 showed only a trifling increase—36,679,000 lbs., against 36,579,536 lbs. in 1908." Exports to the United Kingdom were 12,285,360 lbs. in 1909, against 12,629,117 lbs. in the previous year. However, "consumption in this country is steadily increasing, as the quality of Java tea is satisfactory, and there are many more buyers than used to be the case. The teas sent to this market are favourably received, as they are now invariably well sorted and carefully made, and evidently the factory supervision is very effective as the outcome of past criticism. Their useful crop character and comparatively cheaper value, compared with other growths, cause them to attract buyers, especially when common grades are relatively dear."

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The Scientific Officer.

Mr. Anstead is leaving Central Travancore for South Travancore about the time that this number issues from the press; and is expected back at headquarters about the 10th instant. He will remain here only about 8 or 10 days before proceeding to Coorg.

Publications.

The revised rules of the S. I. P. B. F. have now been sent out; as well as copies of the U. P. A. S. I. Labour Committee's report. The latter is a confidential document, for private circulation only, and can be had by members of District Planters' Associations affiliated to the U. P. A. S. I. at a cost of 8 annas per copy.

All orders received up to the present time have, it is believed, been executed. Should any have been overlooked, the Secretary would be glad to receive a reminder.

The Pest Act.

Mr. C. E. Abbott writes:—

"I see that during the discussion on the proposed Pest Act, I am reported to have said in committee that 'Everybody was unanimous about the necessity for a Pest Act' (Book of Proceedings p. 115). My recollection of what I said is to the effect that, 'if we passed the resolution it would appear that we were unanimously in favour of such an Act, though several Delegates had spoken against it; and that if in the course of years we got the Act, and it proved unacceptable, it would be thrown in our teeth that we had again worried Government into passing unpopular legislation. Further that the Wynaad Delegates had no instructions to support the proposal, and I doubted if it would be popular in the District.'

"I hope you will publish the above correction. The Pest Act was not specifically mentioned on the Agenda Paper (Circular 22/10), and so was not discussed at our Wynaad Meeting.

Government Purchases of Cinchona.

With reference to the Resolution passed at the Annual Meeting of the Association on the subject of the grant of a fixed minimum price of one anna per unit for cinchona bark purchased from local planters, the Secretary to the Government of Madras, Revenue Department, writes that the question was recently again considered by Government in July last, and it was decided that the decision arrived at in 1908 could not be modified.

Notes and Comments by the Scientific Officer.

69. *Lime*.—I am glad to welcome an interesting paper [*vide p. 475*] by Mr. S. L. Mathias dealing with the manufacture of Lime for agricultural purposes. I strongly believe in the benefits to be obtained from the systematic use of Slaked Lime, applied at the rate of about two tons per acre, on the Coffee Soils of Southern India, but my recommendations on this matter have been criticised on account of the cost of the treatment, and the difficulty of transport.

I consider that Lime could be sold by the producer more cheaply than it is at present, and a fair margin of profit still be left, and I have several times urged planters to take up this important matter either individually or through a Planters' Association. I am gratified to see that Mr. Mathias has considered the matter, and by an ingenious method of packing has apparently overcome the difficulties of transport and storage while at the same time considerably reducing the cost of production, as he assures me in a letter on the subject.

Mr. Mathias has forwarded samples of his packages to my Office, and these will be carefully tested and examined on my return from tour, and when the Laboratory is ready for use analyses will be made of them to test how far Mr. Mathias' claim that this kind of package will resist monsoon damage to the Lime contained in it is true.

In the meanwhile I hope that Mr. Mathias will receive the support from his District Planters' Association in his experiments which I am sure that he deserves.

70. *Crude Oil Emulsion*.—In the *Planters' Chronicle*, Vol. V, p. 67, Mr. H. M. Lefroy, the Imperial Entomologist, writing from Pusa, called attention to the use of Crude Oil Emulsion as an insecticide, and extracts from a pamphlet on the subject, prepared at Pusa, were published.

This appears to have aroused some interest, and shortly afterwards enquiries were made from the Shevaroyas as to where this insecticide could be obtained. Further reference to Mr. Lefroy elicited the fact that it was obtainable only in Calcutta, and the following information has now come to hand from the manufacturers, Messrs. Bathgate & Co., 19 Old Court House Street, Calcutta :—

“The cost of the Emulsion is Rs.6-8 per 5-gallon drum. Regarding consignments by steamer, we are prepared to pay freight to the ports of Calicut, Mangalore, Tellicherry, and Quilon, on lots of not less than 5 five-gallon drums, but we cannot pay carriage on consignments sent by rail.

“The railway rates we find on enquiry are as follows :—

“To Bangalore Rs.3-4-1 per maund, to Coimbatore per maund Rs.3-7-9, to Mettupalayam Rs.3-8-8 per maund, to Kodaikanal Road per maund Rs.3-11-8. At those rates a consignment of, say 5 five gallon drums would cost, roughly, without allowing for incidental expenses, about Rs.46 at Bangalore, Rs.47 at Coimbatore, Rs.47 at Mettupalayam, and Rs.48 at Kodaikanal Road.”

Though the insecticide is undoubtedly a very good one it will be seen from this that it will prove to be a very expensive one on the estate, but the information is given here for the benefit of those who are interested.

RUDOLPH D. ANSTEAD,

Planting Expert.

PLANTERS' PAPERS.**II—On Lime.***

I have for some time been impressed with the desirability, nay the necessity, of lime being used more largely as a Manure by Planters for their Coffee Estates. I have been attempting to solve the difficulties of obtaining good first-class lime and transporting it to the Estate without deterioration or loss in transit. As a Planter of some experience, who maintains a lime-kiln of his own, I propose to state briefly, at the request of our learned Planting Expert, my ideas and methods about this matter. Planters have not been able to take full advantage of lime as a manure because of these difficulties.

Its value as a plant-food, its beneficial action on the soil by rendering plant food elements more readily available for absorption, and improving the aeration and drainage of the soil, and its action in converting the inert nitrogen in the soil into plant-food-Nitrogen by the process of Nitrification have been concisely dealt with in the Planting Expert's paper on Lime—the Novr. & Decr. 1909 and also Febr. & Sept. 1910 &c, issues of the *Planters' Chronicle*. So, I need not go at length into that portion of the subject.

A generous application of lime to the soil of our Coffee Estates is, in my opinion, necessary at the present state of Coffee-Planting. Mysore hill soils are generally deficient in lime; and the soil of our Coffee Estates especially appears to require something to neutralise and so render assimilable the acid that has been steadily accumulating in the soil from decomposition of the mulch and the continuous application of poonac and bones and other phosphatic manures. I also believe that good results can be obtained by immediate application of lime manure to portions of the estates where the tendency of the trees is for much leaf and little flower.

Lime, besides, is the handiest and a very convenient parasiticide and in conjunction with equal or double parts of sulphur forms a useful weapon in our war against fungi and insects in general. One point, however, must be remembered:—to mix the lime well with the water before the sulphur is added on to it to make an effective germicide.

The main difficulty in treating our soil with lime was that of obtaining lime of high grade with a minimum of Magnesium. As the Planting Expert observes in a letter to me—"I feel sure that the lime at present obtainable for agricultural purposes is often of an inferior order and a high price, and that there is room for some one like yourself to take the matter up and put on the market a high grade product at a reasonable price and yet leave a fair margin of profit. The lime I see is generally badly burned and it often contains a large quantity of stones and rubbish." I have therefore a lime-kiln of my own at Karkal, 33 miles from Mangalore on the "Mangalore-Agumbe" road, where picked shells are brought from the Coast, washed thoroughly clean, separated from all stones, sand, mud and other rubbish, well dried and then carefully burned. An up-to-date furnace enables the burning to be done almost to perfection. There is, however, a little partially burned shell always left, and this is carefully separated along with the ashes, and other rubbish, and the pure quicklime is thus got. And in the case of slaked lime every care is taken that it is got clean and fine powdered. The lime thus got is packed without loss of time in Mooras (as described below) and stored in a close building. To obtain pure lime care must be taken to separate all unburnt shell and remnants, and that time is not allowed between burning and packing so as to prevent absorption of moisture and carbon dioxide from the air.

[* See Scientific Officer's Note No. 69, p. 474.]

The material into which the lime thus obtained is packed has much to do with its value as a manure. Gunny bags are generally used to pack it in. They are generally too wide meshed, with consequent loss in quantity. They are too pervious to moisture and CO_2 from the atmosphere. And if, by any chance, they get wet, the bags containing quicklime, burst, and the lime becomes almost useless. For the same reasons, lime cannot be stored in bags for any length of time because of its avidity to moisture and CO_2 , and it is not possible to stack with safety several bags one upon another, as the lower bags are likely to give way. I, therefore, pack my lime in grass and straw; 64 lbs. nett of lime to make one Moora—in the same way, but more carefully, as rice is packed and stored on the West Coast. It is probably not generally known that when lime used to be imported from Goa by sea to other coast parts, it was packed in Mooras as I do now, I find that the objections to packing in bags are all overcome by this method, especially with double-packing chiefly in the case of unslaked lime. For, such Mooras are practically impervious to air and water, and a double packed Moora of quicklime kept under water does not burst. Stacking them one above another, both at the kiln and at the Estate, is easy and convenient. Unlike bags, they stand rough handling and treatment in the difficult transit over the ghauts. They exactly fit into a cart, two in a row, and each cart can well take 18 Mooras. There can be no loss by leakage, and checking of the quantity on delivery at the Estate is simple. The packing material is itself an article in good demand on the estate for mulch, whereas lime-packed bags cannot be used subsequently to pack any other article. And the lime adhering to the straw and grass adds to its value in mulching, as it assists in the steady decomposition of the mulch. Even the straw rope used to tie the Mooras, usually about 50ft. in length per Moora, is useful on the Estate, for various sundry purposes. In the field the unopened Mooras may safely be left overnight, covered with the straw of the Mooras already opened without the least damage to the lime even in a shower of rain. One moora of slaked or unslaked lime with single and double packing are of the total weight of 66 and 70 lbs., respectively, and are therefore easily carried even by a female cooly from the store to the field without the Mooras having to be opened. Even if there should not be sufficient godown accommodation on the Estate these mooras can be stacked in conical heaps of 80 to 10 tons each, on a base of straw on a floor about 3 ft. higher than the rest of the ground and covered against wind and rain with a good quantity of straw longitudinally laid, fastened by taking the straw rope round it from top to bottom. Stacked in this manner, the lime will keep any length of time through the heaviest monsoon without any loss in quality or quantity. I have made this suggestion, as lime can best be applied in the months of February and March, and at times it may not be convenient for the Planter to apply all the lime in stock, by reason of scarcity of labour or early blossom showers, and the necessity will then be seen of an effective and ready way of keeping the lime over till after the monsoon. Moreover, every Planter will need some lime always in stock for whitewashing, germicidal and other purposes.

I don't mean to suggest that lime alone can thus be stored till after the monsoon on the Estate; but this cheap and effective method will serve equally well with rice, poonac, or bonemeal, only care being taken to keep a layer of straw between the bags or Mooras and in the interstices. Of course, articles packed in bags cannot be heaped in large and high stacks, but there should be several small stacks. But Mooras can be stacked to a pretty good height. These stacks may even be along the Estate road in close proximity to the field where the article will be required. This clearly demonstrates the superiority of packing in Mooras over bags.

I close these suggestions with a few hints that, I believe, may be useful. A planter would do well to purchase and keep in stock both slaked and quicklime, because quicklime packed in double-Mooras as above, is safer in transit and also in the store and keeps better over any length of time, while slaked lime may deteriorate a little after some time. Slaked lime can be applied straight off and requires less labour than quicklime and is available for ready use. If required, quicklime can be slaked effectively with a little practice just before application as required for the day. Slaking on the Estate should not be done by exposure. The water used should be clean soft water and should be neither too much nor too little. The proper method of slaking can be arrived at, with a little experience. Of course, when cart hire has to be considered it is economical, if possible, to transport lime in the "QUICK" form rather than the "SLAKED," since 56 lbs. of unslaked lime gives 74 lbs. of slaked lime. In issuing lime from the store, care should be taken to issue approximately as much only as would be used up in the day, and it must be remembered that limed soil should not be treated with other manure in that year. For this purpose, the Estate should be divided up into 5 or 6 sections, to be treated in rotation each in a year.

My idea of packing and transporting lime to my Estates, I have found more economical and far more efficacious than doing so in bags. And, I have been able to deliver at my Estate lime from my kiln at "Karkal" at less cost and in better condition than if I should have purchased the same in the market. I have no doubt that my brother Planters would find it so too. I have described this method in detail, hoping that friends interested in this subject may offer their suggestions and enable the Planter to overcome the difficulty of obtaining this valuable manurial agent in a really efficacious form in these bad times for coffee.

I shall be glad to supply any further information on the points raised in this article, if any reader should apply to me.

(Signed) S. L. MATHIAS.

TAPPING CASTILLOA IN TOBAGO.

Mr. Robert S. Reid, writing from Tobago (W. I.) on June 9th to the West India Committee, said that the visit of Mr. J. B. Carruthers, Acting Director of Agriculture, had considerably aroused the interest of rubber planters, who were no longer content with the half-pound per tree hitherto obtained from *Castilloa elastica* in view of Mr. Carruthers' statement that this tree microscopically contained as much caoutchouc as Hevea, the problem being to extract it thoroughly. Experimental tappings under Mr. Carruthers' direction were made on several plantations, and it was confidently anticipated that an improved tapping tool would shortly be forthcoming. Mr. Carter had sent samples of the "Carter-Schofield" knife, which had found great favour in Brazil, and commercial quantities would soon be obtainable. The general impression was that the right instrument would be one with a thin double-edged blade, operated by a spring to ensure rapid exit and thus minimise the wound, and therefore the quantity of scrap. As a Tobago planter had invented a *beau idéal* rubber separator, it was hoped that the little island might evolve an improved tapping knife for the Castilla trees, of which so large a number was now at or nearing the producing age. Mr. Carruthers had heartened the planters by his remarks on the growth of the Castilla trees in spite of the almost "bush cultivation," as he called it, as compared with the clean weeding of the Far East. He had further stated that their soil and rainfall were admirably suited for Hevea, and the yield of latex (in Tobago and Trinidad) was equal in quality and quantity to the East. The only drawback was the labour, which was so erratic and dearer than in Ceylon and Malaya.

DISTRICT PLANTERS' ASSOCIATIONS.

Nilgiri Planters' Association.

General Meeting of the Nilgiri Planters' Association held by the kind permission of Mr. L. Davidson, I.C.S., at the Collector's office, Ooty, on Friday, 23rd September, 1910.

PRESENT :—Messrs. L. L. Porter (in the chair), Rhodes James, L. Davidson, I.C.S., Travers Phillips, G. Oakes, H. D. Wilbraham, J. H. Pascoe, W. Deane, A. S. Dandison, A. W. Cherry, J. McKenzie, R. E. Campbell Gompertz, W. Scott, P. M. Sathasiva Moodr., E. Hardy, F. H. Butcher, and E. F. Barber, Hon. Secretary. By Proxy Mr. F. M. Cockburn.

The proceedings of the last meeting were taken as read and confirmed.

1. Proposed by Mr. Dandison and seconded by Mr. Sathasiva Moodr : "That an enlarged photograph of Mr. H. P. Hodgson be presented by the Nilgiri Planters' Association to the United Planters' Association of Southern India as a mark of appreciation of Mr. Hodgson's services to the Planting Community." Carried unanimously.

2. The Bangalore delegates were called upon for their report, and it was proposed by Mr. Rhodes James and seconded by Mr. Porter, "That the Delegates' report be adopted." Carried unanimously.

3. As Mr. Barber is shortly leaving India, it was proposed by Mr. Barber and seconded by Mr. Deane, "That Mr. Porter be asked to take up the duties of Honorary Secretary." Carried unanimously, and Mr. Porter accepted the work.

4. *Experiment Plots.*—The following committees were appointed :

Coonoor—Messrs. Rhodes James, Porter and one other.

Kotagiri—Messrs. R. E. Campbell Gompertz, W. Deane and A. W. Cherry.

Ooty—Messrs. G. Oakes and two others.

Kullakambay—Messrs. A. S. Dandison, Norman Grey, and J. H. Pascoe.

5. *King Edward Memorial.*—It was decided to leave this matter to individuals and to take no steps as an Association.

6. *Laboratory for Scientific Officer.*—Proposed by Mr. Rhodes James and seconded by Mr. Oakes, "That a circular be issued to all members of the Association stating briefly the requirements of the Scientific Officer with regard to a Laboratory and asking for their individual donations with as little delay as possible." Carried unanimously. Fourteen members present subscribed Rs.315.

7. *Hybridisation of Coffee.*—Mr. Rhodes James suggested that a suitable piece of land be obtained from Government for experimental cultivation. The present garden at Kallar was considered to be too low down. Mr. Davidson pointed out that Mr. Butcher had only $\frac{1}{2}$ an acre of land higher up and this piece also was not considered suitable. Mr. Davidson had written to Mr. Anstead on the matter but at the time of the meeting had not received a reply. After much discussion, on the proposal of Mr. Rhodes James seconded by Mr. Deane, the following resolution was carried : "That a request be made to Government through the Collector to grant a piece of land at suitable elevation between 3,000 and 4,000 feet for experi-

mental purposes under the advice of the Planting Expert, for the hybridisation of Coffee and Rubber and for proving what products may be successfully grown by planters in this District." It was understood that the plot would be controlled by the Curator of Government Gardens.

8. *Coffee Cess*.—It was pointed out that the replies to the Honorary Secretary's Circular on this matter were not complete. Mr. Deane spoke in favour of this cess, especially emphasizing the necessity of combating the adulteration of coffee that was increasing in coffee drinking countries. As a result one or two members hitherto opposed to the cess withdrew their opposition, pointing out, however, that in their opinion an "Anti-adulteration Campaign" was likely to be of more benefit than a "Popularization scheme." No resolution was passed, as the Association had already expressed its desire for a Coffee Cess.

9. *Pest Act*.—After discussion the following resolution proposed by Mr. Dandison and seconded by Mr. Oakes was carried by 7 votes to 4:—"That this Association supports the resolution passed at the U. P. A. S. I. meeting for the introduction of a Pest Act."

10. *Prevention of Thefts of Coffee*.—Mr. Travers Phillips, the District Superintendent of Police, explained to the members present what assistance the special force, sanctioned by the I. G. P. would afford them, and he asked for co-operation and support. Some suggestions made as to how the police should work will be followed out.

11. *Non-Service of Warrants*.—Letters from Mr. Wapshare and Mr. Church were read. The Collector pointed out that the resolution passed at the meeting held in June last could not be cancelled without a reference to Government. Mr. Travers Phillips said that it is absolutely necessary that a man should be sent with the police to point out the defaulter.

12. *Votes of Thanks* were accorded to the Collector for the use of the room; to Mr. Davidson and Mr. Travers Phillips for kindly attending the meeting; and to the Chairman.

(Signed) L. L. PORTER,
Chairman.

(") E. F. BARBER,
Hon. Secretary.

LORD MINTO—PROPOSED STATUE IN CALCUTTA.

A preliminary meeting, convened by the President and Committee of the Bengal Chamber of Commerce, will be held in the rooms of the Chamber at 5-30 P.M., on Tuesday, the 27th September 1910, for the purpose of initiating a permanent memorial to Lord Minto in Calcutta, which it is proposed should take the form of a statue, and to form a provisional Committee to make the necessary arrangements. The President and Committee are confident that the eminent services which Lord Minto has rendered to India during the term of his Viceroyalty will secure for the movement which they are now initiating the sympathy of all classes. In convening a preliminary meeting to consider the question they are only giving effect to a strong consensus of opinion that it is in the highest degree desirable that early steps should be taken with a view to the erection in the capital city of India of a memorial worthy of His Excellency.

CORRESPONDENCE.

The New Manihot Rubbers.

Mudigere, 23rd September, 1910.

Sir,—The germination and growth of the Manihots has been so much discussed that I make no apology for giving my experience in the hope of eliciting more information.

It seems to me that germination or failure all rests with the quality of the seed. I have had seed from William Bros., Ceylon, The Lal Bagh, Bangalore, and Mr. Hew Kennedy, and I have experimented with them in many ways, with the same result in all. Either the whole lot failed or all the experiments gave pretty well the same results.

I have had no *Piauhyensis* from Mr. Kennedy lately, but I have just had a lot of *Dichotoma* which gives about 30% germination, so I advise planters who want this jat, to write to him at once. He tells me that he has still some left of this same shipment.

Of the Lal Bagh *Dichotomas* in the last shipment not one has germinated that I can hear of, but a lot of *Piauhyensis* which I got from them at the same time is giving me a few plants 8% at present. This is a harder seed and may go on germinating gradually for a long time yet, but if you don't get *Dichotomas* to germinate within a month I doubt if you will get many at all.

I don't think that any difference can be traced in my various methods of germinating. Perhaps a light, well drained sandy bed with a *light* covering of horse manure may be best. My best results were at stake in a clearing with a little horse manure. Fairly heavy rain, followed by a spell of light weather came on soon after planting. I lost 50% of my plants from insects, but the germination was good. Clean weeding is essential at first, and in addition a spray may be advisable to keep off insects.

I have made no separate mention of *Heptaphylla*, as I cannot see any difference between them and *Piauhyensis*; that is, in the plants derived from seeds bearing these different names. In both cases probably there are two varieties, one straight growing with generally seven lobes to the leaves and a rather lumpy looking seed pod, divided by ill marked ridges, which after consulting Messrs. Anstead and Krumbiegel I call *Heptaphylla*. The other, a low branching irregular tree with generally 5 lobes to the leaves and a round seed pod having six well defined ridges; this the same authorities agree in calling *Piauhyensis*. Both seem to give a deep yellow evil smelling rubber, the latter perhaps more marked than the former in both characteristics. Both are as brittle as *Dichotoma*, *Piauhyensis* perhaps the worst of the three; its straggly branches seem to be torn about by wind very badly.

To return to germination. In failing lots of *Dichotoma* I have picked out seeds and found an unhealthy exudation from the micropyle (I trust this is the right term) but though I have opened some seeds and found them apparently sound, and have replaced others in the beds no further result has followed. As regards this variety my experience has been that filings, &c., are all vanities and vexations of coolies. If the seeds don't want to germinate I cannot make them; as regards *Piauhyensis* perhaps a light filing may hasten things.

(Sd.) JNO. G. HAMILTON.

RUBBER.**Ceará Rubber in Ceylon.****INTERESTING INVESTIGATIONS OF A LONDON EXPERT.**

Mr. William Wicherley, F.R.H.S., the well-known Ceará Rubber expert, of London, is in Colombo just now, having recently concluded his inspection of the North-Western Rubber Company's properties on behalf of the London Syndicate which is purchasing them. Mr. Wicherley has cabled his report to London, and it is understood that the completion of the purchase will take place on the 31st proximo, the purchase price being over £100,000. [Mr. Wicherley's principals are not buying direct from the local Company, which receives the £100,000 stated by Mr. Rosling in public meeting about six months ago, which will admit of the payment of about R214 for every R100 share in the rupee Company.] Mr. Wicherley, who, it may be mentioned, holds the position of technical adviser to several leading Rubber Companies, and more especially to the Ceará Rubber Plantations in German East Africa and Brazil, accorded a *Times of Ceylon* representative, who saw him at the Galle Face Hotel, an interesting interview on his visit to the Colony, which, on the present occasion, began in August last.

"Will you give me your impressions from the start, Mr. Wicherley?"

"The first thing that struck me before I had seen any of your planters," he said, "was the extraordinary divergence of opinion that seemed to exist in practice among the planters in regard to the distance at which the Pará trees are set out on the estates which I passed through: and also the uncertainty that seemed to exist about the altitude at which those trees will thrive. For instance, I remember seeing a plantation near Kotagala, at some 4,500 feet, with Pará trees which had been in about five years, and it was not to be wondered at that they were not more than about five feet high. If the *Manihot Glaziovii* had been put there it would have made a very respectable show, and it probably would have been a profitable tree. But, in any case, the whole country in Ceylon seems to me to be admirably adapted for the growing of this excellent and profitable tree. What astonished me, perhaps more than anything else, was

THE UTTER CONTEMPT EVERYBODY SEEMED TO HAVE FOR CEARÁ RUBBER,

and I was curious to know the cause of this. An estate I visited in the Kurunegalle District contained a very large number of these trees, of a good age and valuable as rubber producers. I was informed by the Superintendent that they were chiefly used for firewood. He admitted that they produced a splendid rubber, but owing to the ignorance of the method of dealing with the tree, it had been condemned and was giving place to the Pará tree.

"After making careful inquiries in other districts, I found that the real cause why these unfortunate trees had been condemned was because the planter, after having got his tree to maturity, did not know what to do with it; and there appeared to be nobody who could assist him in the matter. The areas of Ceará rubber that would be priceless now as producing lands had been sacrificed to this want of knowledge. It appears that the tree was introduced into Ceylon by the botanist, Cross, from seed obtained very largely in the Rio de Janeiro District, with the result that the true *Manihot* is only to be met with in a few isolated Districts. Most of the Ceará in Ceylon is of a hybrid character. It is, nevertheless, a very good tree, and, if properly handled, will always be more profitable to the planter than any other kind of rubber he can grow, provided that the District and the rainfall are suitable.

"The best altitude for Ceará rubber is from 800 feet to 4,700 feet; it requires to be closely planted—at least 800 to the acre. It does not like its 'feet wet,' or, in other words, it requires its full measure of 52 inches of rain, but delights in four or five months of dry, hot weather. It is rather intolerant of wind, and, being a very quick grower, it will shoot from 12 to 18 feet in a year from seed at stake! It is very rare that the wind is detrimental to it. The best plan is to provide wind belts on all exposed positions by planting the *Darien Castilloa* rubber, which is the Castilloa you have in Ceylon. Here, again, I may mention that

YOU ARE UNFORTUNATE IN NOT POSSESSING THE TRUE CASTILLOA in this Island. Both at Peradeniya and at other places I have visited I was astonished to find this tree labelled the true Castilloa. The tree that you have in the Island is extremely handsome, but it is absolutely useless as plantation rubber. It is good for wind belts; it grows rapidly, and ought to be used for the purpose very largely on all your rubber plantations. In this instance also, Cross introduced the tree that now goes under the name of Castilloa. He obtained the plants and seed in the Darien Peninsula, whereas if he had gone to Nicaragua he would have found the true Castilloa—one of the most valuable trees it is possible to grow. It can easily be identified by the very large leaf—6½ to 8 feet long, only three leaves to a branch, and the bark of a thick pithy nature. I have seen only one or two of the trees in this island."

"How have the planters taken to your suggestions regarding Ceará rubber?"

"I had the pleasure of being introduced to some of the most renowned and clever planters in this island. As to their hospitality, I can only say that I have never had a more glorious time in my life. On the other hand, I am afraid I have not converted many of them to the virtues of Ceará rubber. Perhaps this is because I have not had the opportunity I should like to have had of giving practical demonstrations of the manner in which this tree ought to be tapped and treated generally. Perhaps I shall have this opportunity on the occasion of my next visit. In the meantime, I have approached the most likely people who will take up the matter, and I have been able to show one or two planters just how the tree ought to be tapped. And it is quite possible that my book on Ceará rubber will be published before I return to the Island. In that case, I feel that my task will be easier and that the tree will very shortly come to its own among planters in Ceylon. The latex of the Ceará tree is unequalled by any other species of rubber planted. It holds as much as 87½ per cent. of pure caoutchouc, while, for resiliency and strength, it is unapproached. For these reasons it is becoming a great favourite with tyre manufacturers, and

THE DEMAND IN THE NEXT YEAR OR TWO WILL BE VERY LARGE and widespread. There are vast areas in Ceylon that can be opened and planted with Ceará and brought to a producing stage at a cost of less than £20 per acre. There are plenty of people in London who would have no hesitation in offering from £60 to £100 an acre for such properties as these. The trees are tapped in their third year, when they yield, on an average, a quarter lb. of dry rubber per tree. In the fourth year one lb. per tree is secured, and after that, the trees yield in extraordinary fashion. Some, I admit, are stubborn and mulish. This is characteristic of the Ceará tree, but a fairly healthy tree of six years of age will give on an average 4 lbs. of rubber per tree. When I remind our planter friends that 800 trees to the acre will thrive abundantly and give this average yield, I need not say any more as to the merits of an estate planted with this rubber."

"It does not appear to have succeeded altogether in Ceylon," our representative observed.

"I have already said that the primary reason why this is so is because of the hybrid character of most of the plants I have seen; but there are large areas which possess the true *Manihot*. The proper method of dealing with this tree is to tap it in two different periods of the year. First, at the end of the rainy season, and, on the second occasion, after the revival of the tree following the fall of the leaf. This tree possesses a double bark. The outer one is thin and papery, like that of our English birch. This outer bark must be removed before the tree is tapped. The proper system is to leave six inches of bark at the base of the tree, and then to remove 36 inches of the bark, measuring from the base. The tree should then be tapped immediately. In Brazil, the trunk is merely pricked, as the latex in that climate flows very slowly and thickly, and in that form it is permitted by the seringueros, or rubber collectors, to coagulate on the tree, where it remains two-and-a-half days or more before it is collected. This is the well-known scrap Ceará of commerce, and this is

A CHEAP WAY OF PRODUCING CEARÁ RUBBER.

The better method is practised in East Africa and in some parts of Southern India. There the tree is tapped by a series of pricks and the latex is guided into the main channel, kept in a liquid form in the cups by a dilution of one in a hundred of ammonia water, and subsequently made into biscuits. In this form, it always obtains the highest price on the Hamburg market.

"The system of tapping that I would advise in Ceylon is to tap a tree by the system of convex cuts guided into the central channel, with the latex cup at the base of the channel. This would permit of the tree being approached 17 to 20 times at each season. The Ceylon planter makes the terrible mistake of paring his tree and then leaving it to grow before he attempts to tap it. It is for this reason that so many of the Ceará trees in Ceylon have grown sulky, have refused to give the latex and have been subsequently destroyed. On no pretence whatever should the Ceará rubber tree be stripped of its bark without also being subjected to tapping. The phenomenon peculiar to Ceará rubber—of going to sleep for a period of over a year—has also been responsible for its untimely destruction. Planters have imagined that because the branches lose their leaves, and the poor tree, having been tapped during that period, has refused to give its latex, that it is dead. Its condemnation follows as a matter, of course."

"What do you think of the future of Ceará rubber?"

"Well, we hope for a better era of things in the near future. I am told that the fact that Ceará rubber requires only sixty to eighty days of cool labour to work it will intensify the difficulties of the labour problem in Ceylon. Planters have asked me 'What will you do with the coolies in the meantime?' That, in my opinion, is a question that will easily right itself. We have not yet fathomed the enigma of a suitable catch crop for growing rubber, but we are on the eve of it if all that I anticipate in regard to one particular crop—the soya bean—is realised. I will content myself with saying that

THIS CROP MAY REVOLUTIONIZE THE INDUSTRY OF RUBBER PLANTING IN CEYLON,

and add enormously to the riches of its export, and its reputation as the home of many of the most highly-prized products of the world."

"Will you go into details, please?"

"I am afraid I must be silent on this matter," Mr. Wicherley replied, smiling significantly.

BULB RUBBER.

At the end of the interview, Mr. Wicherley said :—

"It is quite possible that, on my return to Ceylon, I may be able to show specimens of bulb rubber which will be invaluable for interplanting amongst Pará and other trees. The exploitation of this rubber may enable the planter to solve the question of cooly labour in regard to tapping his trees. He will not then subject them to daily visits, but will tap them on a rational system which will permit them to rest for, at least, the greater part of the year."

PARÁ RUBBER.

Talking about Pará rubber, Mr. Wicherley said he was, of course, referring to the *Hevea Brasiliensis*. He added that it might be interesting for those in Ceylon to know that the Brazilian Government resented the plantationist in the Mid-East calling his rubber Pará rubber, and he was informed that serious action was to be taken in the matter very shortly. Pará was a Brazilian port, as was well-known, and the rubber was named after that port as being the centre of shipment. The Brazilian Government, therefore, claimed that they had a copyright in the name, and so Ceylon would have to call its trees by another name. He would suggest calling it Ceylon Hevea as distinguishing it from the Malay.

"As regards Pará rubber," Mr. Wicherley continued, "I should like to say that I quite realise the difficulties that planters are faced with in tapping this tree, as everybody more or less is an infant in the knowledge of rubber planting. The tree has only been in the Island as a planter's product about ten years, the greater part of the present growth being only four years old. It is, therefore important that every effort should be made to arrive at a common system of growing and tapping this tree. I have no faith in the hard and fast rule as to the distance at which the tree should be planted. For instance, I have seen magnificent specimens of the Pará tree in Kalugara planted 8 by 8 and giving an average of six lbs. of dry rubber per tree. On the other hand, I have seen trees planted 10 by 15, four years' old, which were

MERE LANKY, OVER-GROWN SAPLINGS,

which would never be of any value as rubber producers. Then again I have seen trees planted 20 by 20 which were also very promising specimens and yet, once more, trees planted at the same distance which were a disgrace to their kind. In its natural state the Pará rubber is found only 4 to 5, or even less, to the acre, but they are crowded among jungle growth of every kind. Many trees which I have seen on the Lower Amazon have been almost shouldered out of the ground by other trees. These Pará's, I venture to say, have never seen a ray of sunlight nor any of the intercirculatory air which is supposed to be obtained by wide planting.

"Under these circumstances it is rather difficult for a rubber man with experience of Brazil to speak enthusiastically of wide planting. To my mind 10 by 10 is an ideal system to adopt, especially for undulating country. The Pará tree is very shy of wind and storms, and requires the maximum of 80 inches of rain per annum. It is throwing money away to plant this tree where the rainfall is not up to this average, no matter how promising the country may be. The tree should not be tapped until it has reached its sixth year, or until the diameter of six inches, three feet from the base, has been reached. The systematic paring of the bark that is now being practised has only one virtue in it, and that is—it provides the cooly with easy and congenial labour for, at least, nine months in the year; and I am confident that it is doing the industry no good.—*Times of Ceylon*.

(To be continued.)

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The Scientific Officer.

Mr. R. D Anstead, B. A., arrived back at head-quarters this morning. He will probably be leaving for Coorg about the 20th instant.

The early part of his latest tour is referred to in Sc. O. Paper XLII. p. 487.

Ceylon Import Duty on Tea.

Up to the present, observes the *Times of Ceylon* (September 26, 1910), "no one, in our discussions on the subject of the Ceylon tea import duty, has suggested the possibility of the removal of the duty leaving matters exactly as they are now; but this is the view which is taken by Mr. H. J. O. Braund (Manager, Messrs. Wissotsky & Co). Mr. Braund, talking to a representative of the *Times of Ceylon* to-day, said he had spent several years in Calcutta, and was firmly of opinion that the removal of the duty would not affect Ceylon, or the trade of Colombo, one way or the other. 'I favour its abolition,' he remarked, 'because there is a great deal of discontent among the Indian planters about it. I don't see what purpose it serves; and its removal, in my opinion, would not make the slightest difference to the trade here.'

"'But I assume that the Indian planters, in agitating for the removal of the duty, must see some advantage to themselves by its abolition?' our representative queried.

"'No! I don't think so!' Mr. Braund replied. 'I think they are simply riled because the same conditions that prevail in regard to Ceylon tea entering India do not exist where Indian tea and Ceylon are concerned. I do not think they would send their teas to Colombo. They have an excellent market in Calcutta, and no one is going to blend here with such a climate as ours. I do not think the London blenders would blend here, as some say they would in the event of the removal of the duty.'

"Mr. Braund rather laughed at the idea that blending warehouses, with the essential conditions as regards temperature, &c., would meet the difficulty.

"'Of course, all this talk of 'pure' Ceylon tea," he said, 'is ridiculous.' The days of 'pure' Ceylon tea have passed, and the better class tea of to-day comes from India and not from Ceylon. It is well-known that the finest teas in the world come from Darjeeling and Assam. I think it's out of the question that North Indian teas would be sent here to be sold or blended, and I firmly believe that the removal of the duty would make no alteration at all in things as they now stand. South Indian tea we get here now in bond

because Colombo is the closest market, and I think, in the event of the removal of the duty, Java tea would come here in bond just as Travancore tea does now.

'As, in my opinion, the duty serves no useful purpose, I am in favour of its removal.'

A CALCUTTA JOURNALIST'S OPINION.

In its issue of the 30th September the same paper reports an interview with Mr. Shirley Tremearne, the founder and managing proprietor of *Capital*, who had been spending a few weeks in Ceylon.

"My idea is this," Mr. Tremearne said, "if you take the duty away and allow tea to come in free, inasmuch as Colombo is the half-way house, one may say, from China, Java, Japan, and Calcutta, don't you think Colombo would become the great tea mart of the world? But that depends upon two things, or certainly upon one. Can you blend here? I have seen the various opinions expressed by Ceylon people on this question, but I am unable to say whether you can or cannot. When I say blend—I mean, is your climate such that you can open up teas and mix them and make them up without any detriment to them? That is the question, and I cannot answer it! If your climate is such that you can do it with safety, then Colombo ought to be the very hub of the tea world. Everybody cannot afford—nor does it suit them—to send a buyer to Calcutta, Colombo, and every other place.

"You would make Colombo the actual centre of the tea sales. In my opinion, you would interfere with Calcutta and London very materially, because ships leave Colombo very frequently for America and Russia, and most of the big ports of the world; so that, instead of London being the distributing centre of the world, Colombo would become the centre. But, as I have said, all this hinges on one point—is your climate suitable? Because, if it is not—and if unpacking the various teas and mixing them and blending them here would deteriorate them—what is the use?

"And then there is another point. The only benefit, it seems to me, that would be derived by Ceylon, would be in the wharfage and port dues. You would benefit Colombo by bringing more people here, but it would do nothing appreciably towards developing the trade of the island."

"Do you think Ceylon tea would suffer in price?"

"The price of everything is governed by the laws of supply and demand. If there is a short crop generally, the price has to go up, and *vice versé*. I do not see how the removal of the duty could send the price up at all, because the price is governed by the world's supply; and I do not think the Ceylon planter would benefit in any way. You might get a small increase in price by reason of your being able to blend and distribute from here, but you must bear in mind that all these savings in price go to the consumer in the long run; and I am rather inclined to use the words of Lord John Russell:

'Rest and be Thankful.'

"Of course, you must bear in mind that what I have said is to a certain point tinged with a desire that Calcutta should be benefitted before Colombo, and I cannot see how Calcutta would benefit."

"But Indian planters and others are agitating for the removal of this duty?"

"I don't know about that. As far as I can gather, the Cess Committee and the Indian Tea Association have determined to do nothing. Some persons may be agitating, but I don't think the trade is agitating, as a whole. Some of the buyers in Calcutta may be agitating for it, because, if they can obtain all their goods in one market, they will, of course, go to that market. But I do not think there is any strong feeling about it at all."

Scientific Officer's Papers,**XLII.—SECOND TOUR IN WYNAAD.**

Leaving Bangalore on 20th August I proceeded to Calicut and from there made my second tour in the Wynaad, beginning at Perengoda Estate, which I reached on the 22nd.

In my Report upon my tour in this district made in November 1909, (P. C., Vol. IV, p. 355) when speaking of weeding and the use of green dressings, I wrote, "On some Tea estates a problem to be faced is how to get rid of the heavy growth of bad weeds, such as grass, which at present do a considerable amount of harm and are a constant source of expense. . . . The weeds once having been got in hand they should be replaced by a green dressing crop of some definite variety of plant, leguminous for choice. . . . The establishment of a green dressing is especially beneficial in young Tea clearings where a large area of soil is apt to be exposed to wash and sun. The secret of success is to sow the seed very thickly, and in the first year to give it one weeding if necessary. The chief difficulty lies in obtaining a sufficiency of seed to sow down large areas. . . . Several suitable plants were found" (which have since been identified, and herbarium specimens of many of them sent to the Wynaad Planters' Association) "and I should like to see a number of definite experiments, over areas of an acre or more, tried with these different plants in order to test their several qualities as green dressings."

In the able hands of Mr. A. H. Mead, and his estate Managers, a series of such experiments have been begun, and the results obtained in a short time are most remarkable, and prove once for all that the difficulties of establishing a cover crop exist only in the imagination of those who have not tried.

Some eight weeks prior to my visit weeding operations were begun in young clearings, and the coolies were taught to leave the leguminous plants found among the weeds and to remove everything else. The result has been a surprise to me, and indeed to the experimenters themselves, I think. Large patches of leguminous plants have thus been formed, making a close and perfect cover, and in few places were there not enough to ensure them easily establishing themselves when thus helped by the removal of competing weeds. The commonest plants found were *Tephrosia tinctoria* and *Cassia mimosoides*. There were others, but the first named was the commonest of all, and it is an excellent covercrop, light, and with a spreading habit close to the ground, especially when the main shoot is broken as it will be by the passage amongst it of the pluckers. The result is that in a few weeks about 100 acres of Tea has been obtained so closely covered in with *Tephrosia tinctoria* that I estimate that it will yield about 200 lbs. of seed per acre, enough, that is, to sow down next year about 1,000 acres of young Tea. *The cost of this has been practically nil.*

This is a practical demonstration the value of which cannot be exaggerated. An essential part of the policy of these experiments is a dry weather cutting of the green dressing with a forking, and a manurial system consisting of Basic Slag and Potash one year and a complete fertiliser the next.

If the weeds on any estate are examined it will be found that many of them are leguminous, not necessarily the two plants just mentioned but some others equally good. For instance, on other Wynaad estates *Crotalaria nana*, and *Indigofera tinctoria* were found to be the commonest legumes. This experiment has already proved that the best way and the cheapest possible way to begin the establishment of a cover crop is to choose a legume indigenous to the estate, and leave it when weeding; then to save the seed from this and sow down the patches where the plant is not found in abundance.

It must be understood that the starting point when sowing is a clean

weeded place, and the cover crop is intended from the very beginning to take the place of other plants, and to prevent the possibility of grass and bad seeds taking possession of the soil. After a dry weather dig and clean weed the seed should be sown, and when the rain comes the legumes and the weeds and the grass will all start together. Then a weeding is done, and all but the legumes are removed. This system of preferential treatment, repeated if necessary at a short interval, enables the legume to establish itself and make such a dense cover that grass and weeds cannot grow beneath it.

These experiments are in their initial stages only, and the chief points now to be thrashed out are, (1) Whether *Tephrosia tinctoria* will spring up again in the monsoon if cut within six inches of the ground in the dry weather. Judging from its growth and behaviour in its wild state it in all probability will do so, and obviously this will be a great advantage. (2) The quantity of seed it will yield. (3) The weight of green dressing it will yield per acre, as a mulch, or material to be buried, when completely established. (4) The amount of Nitrogen this will supply to the soil. This amount can be deducted from the amount applied in the general fertiliser to be applied, thus reducing the cost of manuring. (5) Its behaviour in established Tea. It will not be such an easy matter to establish a cover crop in old Tea; constant weeding will have largely removed the indigenous legumes in favour of grass, and the plant chosen will have to be thickly sown and established by preferential weeding, and this may take several years. (6) The effect upon the yield of Tea, and its exact place in a manuring system.

By this time next year the large majority of these points will, it is hoped, be established beyond cavil. The demonstration which is being given in the Wynaad shows just how to establish and handle a leguminous cover crop, and how to do away with wash and weeding, setting money and, more important still, *labour* free; and I advise those who still believe in clean weeding, only and who talk of the impossibility of replacing weeds by a legume not to "wait and see" but go and see, and do likewise.

With regard to the Pepper Vine Disease the position is much the same as when I last visited the district, but I am happy to be able to report that arrangements have now been made to conduct experiments in connection with its control along the lines laid down by Mr. McRae and myself (*P. C.*, Vol. V, p. 14) the plots consisting of 50 trees each instead of 200 as originally suggested. I hope that these experiments will be controlled by a local Committee, as suggested at the last Meeting of the U. P. A. S. I. (*P. C.*, Vol V, p. 373). Since last year a great many estates in the district have changed hands and Pepper is not of the same importance as it was a few years ago, much of it having been replaced by Tea, and this to a certain extent lessens the importance of the disease. There is still, however, a great deal of valuable Pepper cultivation left which is suffering heavily, and it is even worth the while of the District Planters' Association to do all in their power to press forward any proposed methods for discovering a means for the control of the disease.

I had an opportunity of inspecting an area of coffee hybrids. These are, however, in my opinion too near the Liberian type, and the best of them should be chosen and recrossed with Arabian if it is intended to continue work upon them.

From the Wynaad proper I travelled down the Wynaad-Nilgiri ghaut and visited a number of Rubber estates, the last being Kerala, from which place I reached the railway at Pattambi on 6th September and proceeded to Cochin.

As in the case of Tea, weeds and especially heavy grass are the chief trouble to be fought against, and all that has been said above about the use of leguminous plants as an aid in this fight applies equally to the case of Rubber.

In some places Dubby grass is very troublesome, and unless labour is available to fork it out clean and get at it again before it can recover it is apt to get out of hand. I noticed that it will not grow through a heavy mulch, at least for a long time, and rows of mulch were to be seen with no Dubby growing through them in the middle of Dubby three and four feet high, and this suggests a way of attacking it when labour is short and only a limited quantity can be forked out. Concentrate the mulch obtained by cutting down, say, an acre of Dubby on half an acre and fork out the rest. The mulched half-acre can be safely left until later on, when labour is more plentiful, and then forked when it is weak. If 50% of it can be weakened and checked by a simple process like mulching it will be a great help, and will enable concentration of a small labour force on a definite area.

A big resident labour force appears to me to be essential to the success of Rubber growing in this district if the enormously rapid growth of weeds during the monsoon is to be kept in check, which is all the more reason why a system such as that already recommended which will tend to set labour free and reduce the rounds of weeding to a minimum should be adopted. Several substitutes for this method are in practice, and the best which came under my observation was a system of circle weeding, the weeds being formed into bunds below the trees, to prevent wash. This is good work, but the grass seeds in the bunds and will never be entirely eliminated by this method. It does, however, undoubtedly give the Rubber a chance of getting away.

On one estate I was shown an area which had been deep forked at the time it was planted. This is expensive work—it cost about Rs.15 per acre, I was informed—but it is a most excellent way of planting, and weeding was easy in the forked soil. After the forking has been done a heavy sowing of a leguminous plant should be made at the beginning of the monsoon and this preferentially weeded. A certain amount could be treated in this way each year, and the area to be cleared of heavy weed thus annually reduced.

In the absence of any analyses to judge by, the soil in these Rubber districts appeared to be a very good one, much of it being black and alluvial. More drains are needed, however, especially on the flats near the rivers which have a tendency to be swampy and are often flooded during the monsoon. These alluvial flats should be systematically drained when clear in the dry weather, the drains being put in with a tracer. These swampy portions have a tendency to become acid, and heavy applications of Lime from time to time, especially while the Rubber is young, will be found beneficial.

There is a tendency throughout the district to plant stumps which are too young and too weak to resist any competition from weeds. Unless it is quite certain that the weeds can be kept thoroughly in hand throughout the wet weather, stout two year old stumps only should be planted.

One piece of work which it is obvious that the Wynaad Planters' Association must push forward with is the improvement of the district roads. These in some places are at present merely apologies for roads, and I found them during the monsoon conditions under which I was travelling at times almost unpassable.

My earnest thanks are due to the Honorary Secretary of the Wynaad Planters' Association for the excellent arrangements he so kindly made for my tour, and to individual planters for their hospitality and the transport facilities they so generously afforded me.

RUDOLPH D. ANSTEAD, *Planting Expert.*

With reference to Sc. O. Note No. 70 (*P. C.*, Vol. V, p. 474) attention is drawn to the advertisement of the Vermisapon Specialties Company, Coimbatore, in the present issue, showing that Crude Oil Soap containing 80% Crude Oil can now be obtained from that Company.

DISTRICT PLANTERS' ASSOCIATIONS.

South Travancore Planters' Association.

Minutes of a Meeting held at Arnichardi bungalow on Sept. 17th, 1910.

PRESENT :—J. S. Valentine (Chairman), R. Ross, J. B. Cook, S. W. Sinclair, J. Rae, W. Ingram, L. M. Young, J. C. Parker, W. E. Bownass, and L. G. Knight, Hon. Secretary.

The report of this Association's delegate to Bangalore was as follows :—

" I must first thank you for sending me to Bangalore: I was much interested in the meeting, and I also enjoyed the trip.

" I am glad to say there was no necessity for me to speak, for, as soon as I reached Bangalore, I found that the subjects in which this Association is most interested were being brought up, on the lines we should, by more experienced men. Mr. Martin, of the Kanan Devan Association, proposed the burial of the Labour Act, and this subject cannot now be brought up at the U. P. A. S. I. meetings, without due notice being given. The Green Tea Bonus was brought up by the S. Wynaad, and though opposed it was carried by a large majority. It was resolved at the meeting that the U. P. A. S. I. should support the Rubber Exhibition, and I must presently ask this Association to sanction my voting in favour of it. The Mundakayam delegate said he did not quite see the use of it, it would not add a penny to the price of rubber or land values, but the point is I think, that, with Ceylon strongly supporting the Rubber Exhibition, and, also I believe the Straits, it would be impossible for S. India not to show. We were asked to subscribe to the Scientific Officer's laboratory. Delegates began by promising odd sums, Rs.100, Rs.200, etc., and so I refused to promise anything, unless other Associations would subscribe on an acreage basis, but after lunch many Associations promised to do so, and so I promised on behalf of this Association to subscribe at the rate of 6 pies per cultivated acre, and I will presently ask your sanction to this. The U. P. A. S. I. are not at present overburdened with funds, and I believe there was some suggestion of an increased subscription, but one member mentioned that his Association would next year be subscribing some Rs.400 extra and this Association and Central Travancore should each be subscribing on some 1,000 acres extra, and so I trust there is no fear of an extra assessment being asked for.

" Central Travancore brought up a resolution to ask Sir J. D. Rees to bring the Ceylon Import duty on Tea up in the House of Commons, in view of the fact that a favoured exception had been made of Java tobacco coming into Travancore. At the meeting there was a small Tea and Rubber Exhibition, and I asked the Chairman if he would make some mention of the merits of the exhibits, but this was not done, but it was admitted by all I spoke to on the subject, that the Sittar Pará rubber and the Venture Ceará biscuits were the best shown."

A vote of thanks to the Association's delegate was passed.

Rubber Exhibition.—The meeting was generally in favour of supporting this. But an assessment of 4 annas per acre was considered rather heavy, and with a view to lightening this it was proposed from the Chair :

" That the Honorary Secretary be instructed to write to the other Associations of Travancore and Cochin with a view to approaching the Governments of Travancore and Cochin and also the Coast firms for financial support; and also to generally determine the means of raising the money to meet the expenses of the Exhibition." Proposed by Mr. Parker and

seconded by Mr. Valentine: "That this Association take over the responsibility of the guarantee given by Mr. Knight."

The Scientific Officer's Laboratory.—The Bangalore delegate having promised to subscribe to this on an acreage basis of 6 pies per cultivated acre, and the Honorary Secretary having explained that there were sufficient funds to meet this promise, it was resolved: "That this Association do subscribe to the Scientific Officer's Laboratory on an acreage basis and on the distinct understanding that all other Associations affiliated to the U.P.A.S.I. do the same, also that this Association do give a donation of Rs.50 per year towards the upkeep."

Roads.—Resolved that the Honorary Secretary be instructed to write to the Dewan of Travancore asking for a reply to the letter of July 1st on the subject of the Shaliacurry road.

The Scientific Officer's Programme.—The views of members were taken as to the best programme for the Scientific Officer. But a letter was then read from the Secretary of the U. P. A. S. I., of which the following is an extract: "Mr. Anstead desires me to point out that he has to be in Coorg early in October and he therefore doubts if he can give you sufficient time to justify a visit at the end of this month." It was decided to wire a reply: "Think Scientific Officer should visit S. Travancore, what alternative date is available."

It was thought that the reason given was not sufficient to justify the Sc. O. departing from the programme as drawn up by the Committee in Bangalore. With the Sc. O. a comparatively short distance away it was thought the 50 odd hours journey to Bangalore and then back was a waste of the Sc. O's time and the U. P. A. S. I. money. As it was also believed that the programme was to occupy the Sc. O. till August 1911, it was proposed from the Chair: "Resolved that, unless the Scientific Officer fulfill his engagement to South Travancore, all subscriptions from the South Travancore Association will be withdrawn."

A vote of thanks to the Chairman and to our host closed the meeting.

(Sd.) J. S. VALENTINE, *Chairman.*

RUBBER SALES FOR COLOMBO.

A special general meeting of the Ceylon Chamber of Commerce was held at their rooms on September 27, 1910, to consider and, if approved, adopt the by-laws and conditions of sale drawn up by the Special Committee appointed at the last general meeting, for the conduct of sales of rubber by auction with a view to the auctions being commenced from the first Friday in November 1910, and other business.

It was resolved:—

"That the by-laws and conditions of sale drawn up by the Special Committee appointed at the last general meeting, for the conduct of sales of rubber by auction with a view to the auctions being commenced from the first Friday in November, 1910, be adopted."

The form of contract drawn up was adopted, subject to a modification of the wording of a condition, which now reads as follows:—

"(1.) Rubber tendered to be paid for by noon, on the day following receipt of relative account, any difference in weight to be adjusted within three days of delivery," instead of:—"(1.) The Buyer to pay on invoice weights and payment to be made not later than noon on the day after the receipt of the account for the rubber to be tendered. Any dispute to be adjusted within three days of delivery."

INDIAN TEA ASSOCIATION, CALCUTTA.

Extract from Abstract of the Proceedings of a Meeting of the General Committee held on September 20, 1910.

Scientific Department.—A letter was received from the Secretary to the Government of Eastern Bengal and Assam, just prior to the meeting, intimating the intention of Government to increase their contribution from Rs.10,000 to Rs.12,000 for the next five years, the extra contribution being in aid of the proposed Mycological section. . . .

In a letter dated 7th September, Dr. G. D. Hope, Chief Scientific Officer, mentioned that it had been represented to him that there was no recognised mode of procedure by which individual members of the Association could make known their views with regard to the work and programme of the Department. Dr. Hope had corrected the misapprehension and suggested in his letter that as the point was discussed at the meeting of the General Committee with representatives of the Branches and Associations held on 30th July last, special attention might be drawn to it by a circular.

Copies of the proceedings of the meeting referred to had been duly forwarded to the Branches and other Associations for information, but as there still seemed to be some misunderstanding as to the position, it was decided to write to them drawing attention to the suggestion which had been put forward, *viz.*, that the Branch and Associations' representatives serving on the Tea Cess Committee, when attending the half-yearly meeting of that body in the month of January, might meet the General Committee and discuss and arrange with them a programme of operations for the Department for the ensuing year. The Branches and Associations were to be asked, should the foregoing suggestion meet with their approval, to make it known to their members that any representation or suggestion they might desire to make in connection with the work of the Department, may be forwarded through their representatives on the Tea Cess Committee. Such recommendations or suggestions would be dealt with by the General Committee if possible, or reserved for consideration either at the January Meeting referred to above or at a meeting which could be arranged in connection with the half-yearly meeting of the Tea Cess Committee in the month of July.

Tea Seed for Ceylon.—Read letter, dated 14th September, from the Planters' Stores and Agency Co. Ltd., suggesting that in the interests of tea seed exporters, the Chief Scientific Officer might be instructed to give the certificates referred to in the following regulation of the Ceylon Government, *viz.*—

*All tea seed imported into Ceylon from any place in India shall be subjected to a process of disinfection in Colombo, unless accompanied by a certificate from a Scientific Officer either of the Indian Tea Association or of the Imperial Department of Agriculture to the effect that the leaf disease called Blister Blight (*Exobasidium vexans*) does not exist within a radius of 10 miles of the estate or garden on which the seed was grown.*

After discussion it was decided to inform the Company that there was no objection to the Chief Scientific Officer furnishing certificates in cases where the Regulation regarding freedom from blister blight could be complied with. This, the Committee thought, might in many cases be a difficult matter as not only must the garden itself be certified as free from the disease but the surrounding district also. Dr. Hope would require to use his own judgment as regards the granting of a certificate or not in each individual case. Dr. Hope was to be advised accordingly.

CORRESPONDENCE.

Indian Tea and its Rivals.

London, 15th September, 1910.

Dear Sir,—My attention has been drawn to your issue of the 20th August last, and I recognise the practical nature of the suggestion put forward in your article on page 400.

As the person responsible for the advertising matter issued by the Indian Tea Association, I would point out—

1. That in the advertisement remarked on by you the address of the Association was not put in of-set purpose because I get into touch with the grocer by actually interviewing him, and the funds at my disposal were not sufficient to allow of indiscriminate assistance to the trade. I had, therefore, to confine my efforts at first to those grocers with whom I was in actual contact. I may mention that these number some 300, a number continually increasing, and that they are supplied with coloured post cards, pamphlets, material for window display, and other forms of advertising matter.

I enclose samples of these, and you will see that the grocers use pamphlets and post cards to advertise their own brands of Indian tea.

2. That as soon as I felt in a position to do so, I placed the name and address of the Indian Tea Association on my advertisement in the trade papers. I enclose a copy of this advertisement.*

I have ventured to trouble you in this way, as I do not wish the planters of Southern India to be under any misapprehension as to the nature of the campaign which is being carried on.

A. E. DUCHESNE.

[* THE ADVERTISEMENT REFERRED TO.]

* "PURE INDIAN TEA."

"The up-to-date Grocer makes a feature of Indian Tea, which, being a **BRITISH PRODUCT**, grown and manufactured under ideal conditions, commends itself to British palates and British common sense.

"The New Season's Teas are now arriving, and the dealer can avail himself of their wonderful variety.

"He will receive assistance in pushing them from the Advertising Department, Indian Tea Association, 21, Mincing Lane, London, E. C."

[Comment must be reserved, for want of space.—Ed., P. C.]

The New Manihot Rubbers.

Dear Sir,—With reference to Mr. J. G. Hamilton's letter in your impression dated the 1st October 1910 *re* the germination of the above, has he tried steeping the seeds in boiling water, allowing the seeds to remain in the water until the same has cooled down to the temperature of the atmosphere, take the seed out of the vessel, and sow them in a bed specially prepared with good well rotted horse manure—if the weather is dry—water morning and evening, until the seeds germinate, which they will do in about twenty days from the time of sowing, when filing is resorted to the work must be very carefully done, the seeds being very hard in the shells, the latter should be filed at the radicular and—care being taken not to injure the radicle itself. If this is done, it will be enabled to be split up in the ground, and the young plant to appear within three weeks the normal period of germination.

(Signed) R. DE ROOS NORMAN.

RUBBER.

Ceara Rubber in Ceylon.

INTERESTING INVESTIGATIONS OF A LONDON EXPERT.

[*Concluded.*]

"Perhaps in less than five years we shall be looking back on the system with a certain measure of amusement, wondering why it was ever adopted. The system of tapping a tree in Brazil is a safe and easy one. The seringueiro makes his cuts with a small machete, one and a half inches long, and the cutting edge only one-fifth of an inch. Above the cutting edge is the shoulder of the blade, and this prevents the tapper from going into the wood on the tree. He makes his incision in an upward direction at an angle of 50 or 60 degrees. He will make 10 to 20 cuts at one visit, until 60 or 80 cuts have been made. The system lasts from 120 to 128 days, and in that time the seringueiro will obtain on an average four and a half to five cwt. of dry-cured rubber per man

"The system of curing is one which ought to be tried experimentally in Ceylon probably, in the course of a few months, a machine to do the work will be placed upon the market. The latex is gathered in its pure state without acids or water. It is taken to the clearing where the curer has a fumeiro. The latter is simply a cone three and a half feet high like the trumpet of a gramophone. The base has a diameter of 16 inches and the top one of 3½ inches. This is placed over a wood fire upon which four or five nuts off the Uruguay palms are placed. These nuts contain acetic acid and creosote. The curer sits between his bucket of latex and the fumeiro and dips a pedal or spatula into the latex. After first damping the tool, he takes it sharply into his left hand and holds it over the fumeiro—one side of the blade five seconds and the other five seconds. In that short time, a thin layer of latex is completely coagulated and smoked. The operation is repeated over and over again until 16 or 20 lbs. of rubber is collected on the spatula. It is then taken off and dried. That is the *entrefina* Pará rubber which is always the pride of the rubber market.

"Brazilians, up to the present day, are somewhat amused at the elaborate methods pursued by the plantacionists in the Mid-East, and the way in which the rubber is cured. They predict that the fine washed crepe will be unsaleable on the market in the next few years, and I am inclined to agree with them. I think the ideal method of curing your rubber is to be found in the modified system, brought up-to-date by suitable machinery, pursued by the Brazilian seringueiro. When the price of rubber reaches the normal level predicted for it, *viz.* 5s. per lb., then I shall probably find the planters agreeing on a uniform system of tapping and curing the rubber. Meanwhile, it would be very interesting if Peradeniya and the other instructional centres were to provide special facilities for dealing with the whole question.

"Having been engaged in visiting one of the large rubber properties in the Island—the North-Western Rubber Estates, which have been purchased by a London syndicate—I was unconsciously and helplessly drawn into the controversy on the question of

RUBBER WEEDING.

Some of my planter friends were somewhat shocked when I respectfully submitted that there was nothing in it. The estate in question may be called, according to the views of clean weeder, a very dirty estate; but the proof of the pudding is always in the eating, and in this particular property I took the trouble to measure the trees that were growing amongst plentiful growth and those which had been clean-weeded for the last one-and-a-half years. The comparison was very instructive. In every case where the trees

were growing among the weeds, so-called, the girth averaged more than 30 per cent. greater for the year than in the case of the clean-weeded plantation. The reason for this would be obvious to anybody who understood rubber. The clean-weeded soil means market-garden habits introduced into tropical agriculture, and the two things won't work. By market-garden habits, I mean constant stirring of the soil and the removal of every weed as soon as it appears. Now, in the case of Pará rubber, which has to expect at least 80 inches of rain in the year, there can be one result only, and that is the washing away of valuable surface soil. In the case of sloping land this amounts to a ton or more per acre and the consequent exposure of the tender roots of the growing rubber to the sun and its deleterious effects. Whereas, in the case of weeds—I do not here speak of illuk, which is a dangerous feature in any plantation—the undergrowth is of a character which readily permits of periodical cutting by hand. This work ought to be done every two months on grass laid around the roots of the rubber. Here it will form a valuable mulch and provide for the tree just the ideal manure which it requires. The grass-grown ground intervening prevents any possible wash of the soil by the heavy rains. And for that reason, I am not an enthusiast for clean Weeding. The clean-weeded place looks nice, but a delight to the eye is not what the planter requires in Ceylon in these strenuous days. He wants something more tangible for his money." . . .

"I must say that most of the tapping tools I have seen here are awful monstrosities, and, with the exception of one or two, should be officially condemned. They are doing more harm to the rubber than anything else.

DISEASES.

"I should like to say a word about the dangers from disease. So far as they are concerned, I do not think the Ceylon planters need have any fears in this direction. In this respect, Ceylon will always have an advantage over the Malay States, where much of the rubber is growing under conditions which, in my opinion, will, in a few years, result in the appearance of some devastating disease such as attacked coffee in this island. The reason for this is that there is practically no dry season in Malaya, and already the dreaded *diploida* (die back) has made its appearance there. When once this disease obtains a hold the tree can only last another three or four months. I need not point out the terrible disaster that would follow the visitation of such as this in Ceylon—a visitation which would be possible were the conditions the same as they are in the Malay States. For that reason, although the Malay is now making plenty of noise in the rubber world, if I were asked, as a rubber man, where I would put my money, in Ceylon or Malaya, I would unhesitatingly say Ceylon."

"Would you say a word about the interplanting of rubber among tea?"

"Well, I was sorry to see so much of it here, for it means, of course, that large areas of tea will have to disappear just when the demand is growing enormously. There is plenty of room in Ceylon for rubber and plenty of room for tea! The two products, in my opinion, should be kept apart. There is no finer tea planter in the world than in Ceylon, and it would be a pity to see him taking indiscriminatingly on to rubber.

"We are having a Rubber Exhibition in London next year, and I think it would be to the advantage of the industry generally and to the planters of Ceylon, if they followed the exhibition up in the course of a year or two with one in Ceylon, making a special point to obtain from America exhibitors who would be able to show just exactly how and why Brazil, at present, produces nearly 50,000 out of the 70,000 tons of the world's supply."—*Times of Ceylon*.

FURTHER REMARKS.

In its issue of the 30th September 1910 the *Times of Ceylon* states that Mr. Wicherley has received many communications from planters and others, particularly on the question of clean weeding. Mr. Wicherley says the bulk of opinions seem to be in favour of some concerted action being arrived at from a conference on the subject.

"A large number agree that clean weeding, so-called, is not, perhaps, the best thing for each and every bit of rubber land in the Island—so much depends upon the situation and the climate.

"Following an interview which H. E. the Governor honoured me with—it was a very interesting interview—I went up to the experimental station at Maha-Illupallama, and motored over a country which will probably, during the next year or two, be opened up for growing Ceará rubber and other products likely to attract a permanent population to what is now a sparsely-inhabited and almost uncultivated country. I was very much struck with the growth of the crops at Maha-Illupallama. Everything denotes a careful and scientific treatment of the crops, and the cultivation is of a very high order. Ceará rubber of various kinds, including the *Maniçoba jequié*, or, as it is locally termed, *Manihot dichotoma*, showed splendid growth.

"The Ceará rubber proper, in many cases, had arrived at a tappable stage, although it had not arrived at an age of more than two and a half years. This speaks well for the climate of the district, which enjoys a bright period of three or four months. These conditions are ideal for Ceará rubber." . . .

"I should just like to say a word or two about the *Manihots*. I received from various people interested in this plant specimens of leaves and flowers, but, in no case, have I yet seen

THE TRUE "MANIHOT GLAZIOVII"

which is to be found on the Baturite Hills in Brazil. As a result of my interview with H. E. the Governor, early steps will be taken to obtain the seed of the latter plant direct and to provide it, as already said, at cost price to those interested in the culture.

I have very little faith in any of the *Manihots* giving satisfaction in Ceylon. For instance, the *dichotoma* requires a heavy clay soil; otherwise it will always grow brittle and be liable to destruction during heavy winds and after heavy rains. The *piauhyensis*, which is the Piauhy *Maniçoba* of Brazil, is also a delicate plant when grown out of its native soil. It requires a loose gravelly subsoil. The *heptaphylla*, which is *Bahia Maniçoba*, stands on the same plane. It is a delicate plant, and it requires a special soil if it is to thrive out of its native land. And, then again, commercially, none of these *Maniçobas* are considered of much account in Brazil, where the *Manihot glaziovii* is a serious competitor. "There is, however, room for the exploitation of a quick-growing *Maniçoba* which could be treated as a triennial plant, something like the *sisal* hemp, the plantations of which are renewed every three years. . . .

"I have been asked as to

THE PRECISE METHOD OF TAPPING IN BRAZIL,

but I have already dealt with that very fully in a previous interview with the *Times of Ceylon*. In that interview I described the knife in detail. The latex cup used is about 2½ inches deep by 1½ inches diameter at the rim. No water or coagulating agent is used with these cups, the latex being collected in constant shade and in time to enable it to be dealt with by the curer. As I have said, no coagulating agent is used, otherwise the method of smoking would be practically impossible."—*Times of Ceylon*.

The Planters' Chronicle.

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THE U. P. A. S. I.

(INCORPORATED.)

Control of Imports of Plants, &c.

In sending on copy of a letter from the Government of India on the subject of controlling the import of plants, grafts, seeds and the like in order to prevent the introduction into this country of insect pests and fungoid diseases, the Madras Government have asked to be furnished with the views of the Association on the subject.

The letter from the Government of India reads as follows :—

" I am directed to forward copies of a pamphlet containing correspondence regarding a proposal to control the import of plants, grafts, seeds and the like so as to prevent the introduction into this country of insect pests and fungoid diseases.

" The Government of India as at present advised are of opinion that some measure of control is desirable to protect the staple agricultural products of India from danger arising from the importation of insect pests and fungoid diseases with foreign plants. I am accordingly to request that the Government of India may be favoured with the opinion of the Governor in Council on the advisability of issuing under Section 19 of the Sea Customs Act 1878 (VIII of 1878), a notification on the lines of the schedule of dangerous plants which forms an enclosure to the letter from the the Director, Agricultural Research Institute, Pusa, No. 106 dated the 9th July 1910, appended to the printed pamphlet forwarded herewith. It is suggested that the individuals and bodies noted in the margin might suitably be consulted in the matter."

The " pamphlet " referred to runs to nearly 60 pp. of foolscap in print, and is far too lengthy to be quoted in full. A copious extract is, however, given in this issue under the head of " Official Papers," p. 504.

COMMENT BY THE PLANTING EXPERT.

Mr. R. D. Anstead has kindly made the following comment on the Correspondence referred to in the above :—

" In view of the fact that at the last Annual Meeting of the U.P.A.S.I. it was decided to ask the Madras Government for some sort of Pest Act, the importance of the pamphlet received from the Government of India dealing with measures to prevent the introduction of Insect pests and fungoid diseases into India through the importation of foreign plants, is obvious. Lengthy extracts from this pamphlet are reproduced in the *Planters' Chronicle* and these state the case sufficiently well.

" This is not exactly what the U.P.A. had in mind when asking for a Pest Act, but it will be seen that it leads up to a further Act dealing with the control of pests in the interior of India itself.

"How would such a measure affect the planters of South India? The crops we are most interested in may be taken as Coffee, Tea and Rubber. As pointed out in the pamphlet, had this proposed legislation been in force in earlier years the Green Bug would have been avoided. It is possible that we do not run the risk of importing any more diseases of these three staple crops than we have already, but we cannot say this for certain.

"The chief point is, I think, this,—that we are spending a great deal of money to combat and reduce the pests we have, and if the doors are closed to the importation of fresh supplies of them from the outside we have a better chance of exterminating them.

"The difficulties of administration of the proposed Act, as far as the actual fumigation is concerned, are small. In Grenada I had several years experience of the fumigation of imported plants and seeds and was the Officer in charge of this work. All imported plants passed through my hands for examination and treatment, and I found no difficulty in handling them and I never had a single complaint of damage done to any plants by fumigation.

"To my mind the importance of this proposed measure is enormous, and as their Scientific adviser I would respectfully and strongly urge upon the U. P. A. S. I. the necessity of supporting the proposal with all the power at their disposal."

Act I of 1903.

The Planting Member has received from the Under Secretary to the Government of Madras, Judicial Department, a letter stating that the matter referred to in the resolution of the U. P. A. S. I. regarding extradition from Native States of persons charged for offences under the Madras Planters' Labour Act I of 1903 will receive consideration.

In a letter dated 7th instant the Offg. Secretary to the Government of H. H. the Maharaja of Mysore, General and Revenue Departments, writes:—

"With reference to your letter dated 26th August 1910 forwarding for necessary action certain resolutions adopted at the recent Annual General Meeting of your Association, I am directed to state with reference to the resolution relating to the attestation of agreements under Act I of 1903, that the Act referred to therein is operative only in the Presidency of Madras and that no appointments of attesting Magistrates could therefore be made thereunder in Mysore."

Non-Service of Warrants.

A communication from the Secretary to the Government of H. H. the Maharaja of Mysore, General and Revenue Departments, states that an extract from the U. P. A. S. I. letter regarding the Resolution passed at the last Annual Meeting with respect to non-service of warrants and an increase of the Police force in the districts concerned, has been communicated to the Inspector-General of Police in Mysore and to the District Magistrates of Districts.

The Mysore Government have requested "that special attention may be devoted to the execution of the warrants referred to therein, and that due notice may be taken of the conduct of the Police where non-service is due to their negligence."

Emigration of Coolies.

A letter, dated 1st October 1910, from the Chief Secretary to the Government of Madras, Public Department, reads as follows:—

"The Government are satisfied with the existing situation, and consider further control over emigration in the interests of

coolies uncalled for. Endeavour is always made to rectify any case of abuse which comes to the notice of Government, through the periodical reports they receive as to the condition of oversea emigrants and otherwise, and they have no reason to believe that the general condition of emigrants is such as to call for legislative action. They regret therefore that they are unable to support the proposal of the United Planters' Association of Southern India for fresh legislation in the matter, in the directions indicated in the letter read above."

Proposed Bonus on Green Tea.

Mr. George Roinilly has received a letter, dated 22nd September, from the Secretary, Indian Tea Cess Committee, reading as follows:—

"I am directed to acknowledge the receipt of your letter of 17th August on the above subject, which has now been considered by the Executive Committee of the Cess in meeting. You quote a resolution passed at the annual meeting of the United Planters' Association of Southern India, requesting that a bonus of six pies per lb. on four million lbs. of green tea should be allotted from the funds at the disposal of the Committee in order to encourage what may be reasonably hoped will become a self-supporting and expanding industry in the near future. The Executive Committee note from the terms of your letter that a Ceylon firm is prepared to put up a finishing factory for green tea at a port on the coast, if it can be sure of getting at least two million lbs. of tea in the year; and you state that this amount has, you believe, been promised if the bonus is granted.

"2. It is the case, as you mention in the first paragraph of your letter, that there are no unallotted funds at the disposal of the Committee at the present time; and the question of reviving the bonus will have to come before the full Cess Committee at their next half-yearly meeting, for discussion. I am also to say that it is not practicable for the Cess Committee to allot any sum for more than one year. With a view to having the question thoroughly considered at the half-yearly meeting of the Cess Committee which falls to be held in January next the Executive Committee are meantime sending copies of your letter to all members of the Cess Committee, and are inviting them to submit their views on the proposal."

International Rubber Exhibition.

Messrs. Rowe, White & Co., Ltd., of London, write, under date September 16th, 1910:—

"We have pleasure in informing you that we have secured a very good Space for the Southern Indian Section at this exhibition. It is opposite the Malay section and is in our opinion the best site we can get for the money at our disposal. The cost is £156-8-0 for rent. This is of course exclusive of the erection of stands, &c.

"We have made no attempt to secure a good man to look after the stand but on Mr. Richardson's arrival home we can go into the matter, also the details regarding stands, &c."

The Manager of the Exhibition has kindly sent out to me a marked plan to show that "a very important position" has been secured—the last of the open spaces left in the Main Hall. Area 34ft. by 23ft. He writes further:—

"Forms for description of exhibit—we do not issue any forms but if it is written very distinctly, on one side of the paper only, it will be quite sufficient. I am not particular as to length pro-

vided the information is of interest to those who wish to know something about Southern India and its products.

"I shall with pleasure do everything I possibly can to assist in any direction the Committee formed, and also the gentlemen who may visit the exhibition. I will send you Season tickets in good time."

In a later letter the Manager of the Exhibition writes :—

"It is requested that all Rubber Countries exhibiting will kindly favour the Management with a descriptive article on the Industry in their country, as early as possible. This is required for free insertion in the Official Guide Book and Catalogue, and the object in publishing such matter is to give the readers some idea of the country generally, its resources, means of communication with England, accommodation for visitors, inducements offered to investors and settlers, and the history and method of collecting and treating the Rubber, port of shipment, and any information that will be of general interest.

"This article would be the preface to the exhibits from your country. Though not requiring it too long, I should at the same time like it to be as interesting as possible, so as to give those interested in the industry in Europe some idea, of the methods adopted by the Rubber Planters of your country. I would suggest that the article does not exceed 1,500 (fifteen hundred) words.

"No charge will be made for inserting the article asked for, but I may mention that we are only publishing articles of the various countries that are exhibiting.

"Kindly have the writing of this article commenced at once, so that it may be printed and a proof sent out to you for perusal."

Ceylon Import Duty on Tea.

Yet another opinion on this subject is recorded in the *Times of Ceylon* (October 3).

Mr. Herbert Tarrant (partner, Messrs. Tarrant & Co.,) observed to a representative of the paper that if the duty were removed, Colombo would no doubt become the centre for the blending of Ceylon, Indian, and probably Java teas. The removal of the duty would be to the advantage of a few big firms, but, so far as the Island and the Ceylon tea industry generally were concerned, he did not see that it would be of any advantage at all.

"I think it would probably bring a lot of Java tea here," Mr. Tarrant continued, "for there is no doubt that Java is going ahead very much as a tea-producing country. I think Java tea is going to be a serious competitor to Ceylon and Indian tea in the future. They are making very much better teas in Java now than formerly, and many of the estates are giving a big yield.

"Of course, as far as Ceylon is concerned I think it would be much better if the duty could be abolished on British-grown teas, and still kept on as regards foreign teas—if that were at all possible; but I do not suppose for a moment that the Home Government would allow that.

"As regards blending," concluded Mr. Tarrant in reply to a question, "the difficulties presented by the unsuitable climate could be overcome. You need not necessarily expose your tea in the open air! The firm which decided to go for blending to a great extent would probably put up specially-equipped factories for the purpose. The atmospheric conditions could be overcome—in fact, they are overcome now to a very great extent in a good many instances."

Scientific Officer's Papers.**XLIII.—SECOND TOUR IN COCHIN.**

On 6th September I reached Trichur from the Nilgiri-Wynaad and began a tour for the second time in Cochin. The last time I visited this district was in February last, but on this occasion I traversed a different route, and was able to see several estates and localities which I did not visit during my first tour.

The most interesting matter in this district is the progress of the experiments which are being conducted at Palapilly and Vellanikana estates in the prevention of Pink Disease (*Corticium javanicum*) on Pará Rubber, a disease which has done a considerable amount of damage. It will be remembered that these experiments aim at prevention rather than cure, and the trees were painted in the dry season with Bordeaux mixture so that the spores of the fungus, which are wind carried at that time and find a lodgement on the trees, especially in the forks, should germinate with the beginning of the monsoon rains in a medium of Bordeaux mixture which will kill them before the fungal hyphae can gain an entry into the bark. The method was described in the *Planters' Chronicle*, Vol. V, p. 210. The experiments have yet a couple of months to run before completion, so that it is perhaps too soon to say very much about the results, but up to date the treatment has resulted in complete success, and the cases of attack have been reduced to a few individual instances, and these are due probably to the careless application of Bordeaux. Thus in one instance out of 60,000 treated trees there have so far been only three cases of Pink Disease where formerly there would have been hundreds. On estates where Bordeaux mixture has not been used, and which therefore act as a check, the disease has been as bad as usual, and attacked trees may be put down roughly at something like 1%. Unless the unexpected happens during the next two months we have every reason to congratulate ourselves that we have discovered how to completely control Pink Disease. As soon as the experiments are quite finished the whole subject will be written up in detail in the *Planters' Chronicle*. I may, however, say here that the cost of the method will work out at about half a pie per tree.

Where Pink Disease is still prevalent measures are being generally taken to deal with it as soon as it is noticed, and most estates have a 'pest gang' going round and cutting it out. Attempts at curing it by cutting out the area affected, washing the wound with Bordeaux mixture and tarring it, have generally failed, and, as far as I am able to ascertain, some 70% of such treated areas developed the disease again in the following year. I still believe that, if carefully done and supervised, this method is a correct one, but under estate conditions it has not proved successful. Consequently, the affected branch should be cut off at least 18 inches below the point of attack. This is best done with a mallet and a chisel, a neater and smoother cut being made with this than with a saw. In the case of an attack on the main stem, unless 3 feet of tappable trunk can be left, it is better to cut the tree down close to the ground and get a sucker from low down to replace it.

A word of warning, given before, about cutting branches needs repeating. When a side branch is removed it should be cut off parallel to that from which it grows and as close to it as possible, even if this necessitates a larger wound, and not perpendicular to the branch cut off, leaving a stub. Bark will not grow over a stub, which dies back gradually and at last falls out, leaving a hole in which water collects, making an ideal place for a fungus to grow. If a wound is made close to the stem and parallel with it, however large it is, the bark will in time close smoothly over it, and no protection against fungoid enemies is so good as nature's own covering, the bark.

In connection with this work a disinfectant, such as permanganate of potash of the usual strength, for the knives and chisels should be used. As soon as a case has been dealt with these should be washed in the disinfectant, and the coolies should be made to wash their hands before going on to the next tree. A cooly will go to a healthy tree and rub his hands, covered with spores, over it, and many instances are known where healthy trees have been infected in this way. On most Rubber estates permanganate is being used with good results, and all should adopt it.

The diseased portions cut off should be collected and burned as near the spot as possible. It is not advisable to carry them about the estate any more than can be avoided. In some places diseased branches after being cut off are thrown into the nearest river, but this is a practice which I cannot commend, and one to which our Pest Act—when we get it—will quickly put a stop. It is difficult to burn the material in wet weather, but with the help of a little kerosene it gets a scorching and smoking sufficient to kill the spores, even if it is not all consumed, and I saw very good fires being made even while it was raining hard.

It is perhaps unnecessary for me to say any more about the weeding problem than I have already done in my report on my second tour in Wynaad, (*P. C.*, Vol. V, p. 487) but any one who has seen Palapilly estate, even the most obstinate of clean weeders, cannot help but be impressed with the fact that to keep the soil, after its first clearing and weeding, covered with a legume for a year and then with a dense cover of Dadaps is the right way to grow Rubber. It is at any rate impossible to cavil at the results obtained by that method on this estate. It may be worth while to note here that *Tephrosia purpurea* is a very common weed in the district, and it will be seen growing in large quantities on all the open land round Trichur and its neighbourhood.

Mr. Kirk kindly gave me an opportunity, which I very much appreciated, of seeing the rubber machinery working at the Periyar Rubber Co.'s estate at Thattakaad and I was able to follow, and discuss with him, the whole process from tapping to packing.

On 10th September I attended a meeting of what is now the Malabar Coast Planters' Association, and they are to be congratulated on their change of name and all that it implies, and on the enthusiastic way in which they have initiated their Association. If the future meetings maintain the percentage of attendance of that at which I had the pleasure of being present they should do some good work. An Experiment Committee was appointed, and a scheme of experiments in Rubber cultivation sketched out, consisting of manurial experiments, and an investigation of the possibility of extracting the oil from the yearly increasing quantities of Pará seed and utilising the poonac as a manure, on the lines I suggested at the annual meeting of the U. P. A. S. I. (*P. C.*, Vol. V/2, p. 365). The preliminary investigation, dealing with the crushing of the seed and the extraction of the oil will be carried out by Messrs. Peirce, Leslie & Co., Ltd., at Cochin, and I hope to be able to investigate the value of the poonac as a manure in my laboratory at Bangalore.

My sincere thanks are due to the Honorary Secretary of the Malabar Coast Planters' Association for the excellent arrangements which he made for my tour, and to the planters of the district for their hospitality and kindness.

“ RUDOLPH D. ANSTEAD,

Planting Expert.

DISTRICT PLANTERS' ASSOCIATIONS.

Mundakayam Rubber Planters' Association.

Minutes of an extraordinary General Meeting held at Yendayar bungalow on the 24th September 1910.,

PRESENT:—Messrs. J. A. Richardson, Wedderspoon, Smith, F. Hall, G. H. Danvers Davy, R. E. Haslam, Rudolph D. Anstead (Hon. Member) J. J. Murphy (Chairman) and by proxy R. Harley.

Visitors.—Messrs. H. C. Westaway, T. C. Forbes, and J. H. Cantlay.

Mr. Anstead at the request of the Chairman, explained what he would like done in regard to experimental plots. He wished members to select their own experiments and he would then advise how they should be carried out so as to give thoroughly reliable results. With reference to disease he said that painting Hevea trees before the monsoon with Bordeaux mixture as a safeguard against Pink disease had so far shown most gratifying results on the few estates on which it had been tried.

The following experiments are to be made :—

Green Manuring :—Teekoy and Mundakayam Estates.

Effect of Chemical Manures on yield of latex :—Kadamankulam Estate

Tapping system :—Kuttikal Estate.

A Committee consisting of Messrs. Atkins, Vincent, Davy, Harley, and Asher was appointed to see that the experiments are properly carried out. In reply to a question from Mr. Forbes as to whether the nitrogen in rubber seeds would be equally available as plant food if the seeds were allowed to rot on the ground instead of being gathered and returned to the soil in the form of poonac, Mr. Anstead said that the seeds if left on the ground would not rot but would germinate and the full benefit of the nitrogen would not be obtained. If the seeds were pounded, even roughly, this difficulty would be overcome, but it seemed a pity not to extract the oil, which appeared to be valuable and which in 1905 was valued at £10 per ton in England.

A vote of thanks to Mr. Anstead, proposed by the Chairman, was carried with applause.

European Doctor.—It was proposed by Mr. Danvers Davy and Seconded by the Chairman : That the Mundakayam District support the resolution passed by the Central Travancore Planters' Association reading "that an assessment of 8 annas per acre be levied to meet the expenses of the European Doctor Scheme and that the dispensaries either contemplated or at present existing (grant-in-aid or otherwise) are run as before and have no connection with the European Doctor Scheme except that they will be supervised by the Doctor."—Carried unanimously.

The proceedings then terminated.

(Signed) ° J. J. MURPHY,

Chairman.

Messrs. T. H. Allan & Co., of London, have nominated Mr. W. L. L. Grant as their representative on the Home Committee of the U. P. A. S. I. in connection with the International Rubber Exhibition, 1911.

OFFICIAL PAPERS.**Control of Imports of Plants, etc.**

An abstract is given below of Correspondence regarding measures to prevent the introduction of

INSECT PESTS AND FUNGOID DISEASES

into India through importation of Foreign Plants.

The proposal to take action on this subject appears to have originated with the Bombay Chamber of Commerce, whose Secretary wrote, in a letter to the local Government, dated December 27, 1906 :—

" The attention of the Chamber has recently been drawn to the danger of the introduction into India of insect pests, more particularly through the importation of plants from foreign countries. This danger is ever present, and owing to increased communication and trade with various other portions of the world, and the more rapid transport of merchandise, the danger has now become extremely serious. It is reasonable to suppose that if some forms of virulent insect pests obtain footing here, and are allowed to propagate unchecked, the damage done to the staple crops of this country will be incalculable.

" Government, it appears, have already recognised this danger in connection with the importation of cotton seed, and have, in consequence, rightly ordered the fumigation of all such seed at the port of entry. My Committee, however, feel that this precaution only affects one source of infection and that a still greater danger lurks in the unrestricted importation of a vast variety of foreign plants into India. This Presidency is most concerned in this matter, as the greater part of the said importations are made through Bombay. In Europe and America very stringent precautions are now taken, and in Australia plants are thoroughly fumigated on both leaving and arriving in the country.

" Considering the great importance of the question, my Committee strongly urge that similar precautions may be taken in India, and more particularly in Bombay. It is believed that no special legislation would be needed, as the addition of an extra clause to the Customs Act Notifications would amply meet the requirements of the situation. In the circumstances, my Committee trust that the subject will meet with the serious consideration it deserves, and that Government will be pleased to adopt early measures in this direction for the protection of the staple agricultural products of this country."

The Acting Director of Agriculture, Bombay, reported that the question had been informally discussed with the Inspector-General of Agriculture and Mr. Lefroy, the Imperial Entomologist, and undoubtedly merited careful examination; he stated that reports from the Deputy Director of Agriculture, the Economic Botanist, and the Agricultural Chemist showed that a satisfactory solution of the problem will only be attained after the most careful deliberation. " There can," he said, " be no question that there is considerable danger from the source indicated by the Chamber of Commerce, and the recent appearance of the notorious potato moth (*Phthorimaca operculella*) in the Belgaum District, to which Mr. Fletcher refers, is a case in point. Legislation has been undertaken in several countries (Natal, West Indies, Australia, etc.) to meet this danger; but as pointed out by the Chamber of Commerce, action can be at once taken in India under the existing law. The precise form of notification is, however, a matter of some difficulty which can best be settled after examination by the Imperial Experts, in particular Dr. Butler, the Mycologist, and Mr. Lefroy, the Entomologist.

The latter, it is believed, was responsible for the form which recent legislation on the subject in the West Indies has taken." It was suggested that the question be at once referred to the Inspector-General of Agriculture with a strong recommendation that it be at once examined and steps taken to prevent the unrestricted import of plants and the like which may be instrumental in spreading pests and diseases.

REPORT OF THE IMPERIAL ENTOMOLOGIST.

25th June, 1907.

The Treatment of Plant Imports to prevent the Introduction of Pests to India.

INSECTS KNOWN TO HAVE BEEN INTRODUCED.

"1. The following cases have come under my personal knowledge since I arrived in India :—

(a). Pulse seeds of a special variety, imported to Saharanpur, from a good European firm were found to be destroyed by pea-beetles (*Bruchus*) which were living when the parcel was opened.

(b). Another case of the same kind was reported from Calcutta.

(c). Maize seed of specially good variety, imported by the Agri-Horticultural Society of Madras, contained living rice weevil (*Calandra oryzae*).

(d) The consignment of flax seed imported for the Bengal Agricultural Department was infested with the caterpillars of a moth (*Ephestia sp.*) and this insect bred freely in the flax seed.

(e). A consignment of specially good pines from the West Indies infested with a scale insect (*Aspidiotus sp.*)

(f). Yams from Fiji, infested with a scale insect (*Aspidiotus*).

These instances only show that insects are imported in a living state. I have had no special opportunities of finding out these instances and I imagine that such importations are continually occurring. The two other cases known to me are the potato moth (*Phthorimaca operculella*) referred to by Mr. Fletcher and a cane-borer from Mauritius, which was found in imported canes by Mr. M. Mackenzie, Savan, and reared by him.

"Before going any further in this enquiry, it seems to be worth while determining whether there are at present in India any pests that we owe to such importations. If, in the past, no injurious insects have been imported, then there seems to be no necessity to take action. I have tabulated the insects in three classes, those injuring growing plants, those injuring grain, etc., and, as a special case, scale insects, since the latter probably give us the best data.

In the first instance, I have a list of 213 insects which are known to be, in some degree, injurious to Indian Agriculture. Of these, three have been probably directly introduced; such are *Cylas formicarius*, F., the sweet potato weevil (though some entomologists believe this to have originated in India); *Plutella Maculipennis*, Curt., the diamond back moth of cabbage, etc.; and *Phthorimaca operculella*, the potato moth. There are also, out of a total of eight aphides (green-fly), six probably introduced on plants. There are also two insects that are doubtful, *Dacus cucurbitae*, Coq., that may have come from China, and *Nezara viridula*, Linn., that is world-wide. There also 12 moths, which are more or less widespread, occurring not only in India, but in the East, the whole tropics, or practically over the whole globe.

These are :—

Chloridea obsoleta, the American bollworm,
Argotis ypsilon, the greasy surface caterpillar,
Euxoa segetis, a surface caterpillar, and
Euxoa spinifera, a surface caterpillar,
Prodenia littoralis, a tobacco caterpillar,
Spodoptera mauritia, the rice caterpillar,
Caradrina exigua, the indigo caterpillar,
Cirphis unipuncta, the army worm,
Earias insulana, the Indian and Egyptian bollworm,
Sylepta derogata, the cotton leaf roller,
Glyphodes indica, the pumpkin leaf caterpillar,
Pteroloma undalis, the cabbage caterpillar.

I can see no reason to believe that these were spread by trade or by any plant imports; some insects are widespread, as for instance the painted lady, *Venessa cardui*, found throughout the world. The net result is, that we may regard one weevil and two moths as having been introduced, as well as six out of eight destructive greenfly.

Taking insects destructive to grain, dry food products, merchandise, etc., I have a list of thirty, of which twenty are certainly cosmopolitan and may have come in or have been spread from India [*e.g.*, the rice weevil (*Calandra oryzae*)]. There is no question that ordinary grain, etc., does bring in insects, but it is doubtful whether this could in any way be dealt with, and, secondly, whether we have not got all we are going to get.

Thirdly, I may deal with the scale insects. I take these as an example, because (1) they are found solely on living plants; (2) they are in some countries almost the worst class of pests; (3) they are particularly easily introduced on living plants or on roots, tubers, etc., to be used for planting. The 84 known Indian species are :—

		Destructive.	Rare.	Total.
Indigenous	...	9	38	47
Doubtful	...	3	11	14
Introduced	...	16	7	23
Total		28	56	84

This means that of our destructive species, nearly two-thirds are introduced. We may bear in mind that scale insects rarely injure any but a fruit tree or a crop that is permanent, such as tea, coffee, cocoa, rubber. Of the big staples of India, cane is attacked by several scale insects, as also is tree cotton, but there is no damage done to other crops. So far as tea, coffee, and fruit are concerned, injurious species have undoubtedly been introduced, but to a far less extent than in other countries.

PESTS LIKELY TO BE INTRODUCED.

* * * * *

Tea.—The tea industry of India can presumably protect itself; the danger of introducing scale insects on living plants should be sufficient to prevent such importations; the danger would be dealt with by fumigating all plants.

Coffee.—The same applies to coffee; scale insects are alone likely to be imported on living plants. It is possible that, had there been fumigation of plant imports from Ceylon, the green bug of coffee would not have reached India and the impending total ruin of coffee would have been averted. The coffee leaf miner (*Cemistomum coffeella*) is unlikely to be imported save in living coffee plants from the West Indies or South America, and these are scarcely likely to be imported.

Rubber.—Not enough is yet on record as to pests of rubber. It is quite certain that no rubber plants should be imported, unless they are fumigated, nor should any living plants be brought to rubber districts from outside India.

In my opinion, the matter sums up into the following :—

(1) There is danger from the introduction of pests, especially aphides and scale insects, on living plants, roots, suckers, bulbs, etc.,—in fact all parts of a plant *which are intended for planting* and not for consumption.

(2) While there may be danger from insects imported with seeds, food-stuffs, etc., there is no present evidence of it, nor is there any means of controlling the trade.

(3) Returns of plants, etc., imported will show whether there are other dangerous imports, and if such returns are made periodically, it will be possible to determine whether any specially dangerous imports are coming in.

(4) At any moment it may become evident that there is danger of the introduction of a special pest (such as the boll weevil of cotton) and there should be means for *at once* adopting such measures as seem best to keep it out."

MEASURES ADOPTED ELSEWHERE.

"The fumigation of plants and other imports is done so constantly that full details of the process in countless localities can be obtained in current literature. In the United States, nursery-men are usually prohibited from sending out plants not fumigated, and the process is in daily use as a matter of ordinary routine. Many European countries, the United States, the West Indies, Cape Colony, Australia, and Ceylon protect themselves against the danger of importing pests, and the processes in use are perfectly well-known. Every part of a plant, however delicate, can be fumigated with hydrocyanic acid, at such a strength that insects on it will be killed, and the plant be uninjured, *provided the leaves of the plant are not wet*. This process is carried out daily without the slightest risk to the most delicate imports, and I am certain that no other known method will be as good or reliable. For seeds, fumigation with carbon bisulphide is used, and this is already in use in Bombay. It is possible to vary the strength of the fumes and the length of time the plants are exposed to it, and this is generally done in dealing with different classes of imports. Before the process can be applied in India an officer should be deputed to see the process in operation elsewhere. I may state at once that spraying or fumigating with tobacco, or carbon bisulphide, are not reliable in dealing with living plants, nor is any other process adopted abroad than the cyanide one.

Before coming to India, I had occasion to go very carefully into the question as it affected the West Indies; there were in that case two problems: we had to prevent pests being spread from one island to another; we had to prevent pests being introduced from North America, Mexico, South America, and England. I discussed the matter fully in two articles published in the *West Indian Bulletin* (Vol. II, page 324, and Vol. III, page 146). I am still of opinion that inspection of imports by any but an expert Entomologist is useless except in such special cases as potatoes: if the matter is thought of sufficient importance to put an expert at every port, then we can base our recommendations on inspection, and such things may be treated by fumigation or otherwise as the inspector decides; this is, for instance, done in Hawaii . . . or it is possible to notify Madras, Calcutta, and Bombay as the only ports of entry for living plants and other dangerous imports and have experts at these ports only. For the moment I neglect this aspect, as I see no prospect of its being thought desirable.

The next point is to make fumigation so automatic that everything dangerous is treated, *whether it has insects on or not*; for India, I would accept the principle, accepted by the Governments of the West Indies, and first put forward in my paper, that (1) imports of fruit, vegetables, etc.,

intended for consumption are untouched, while (2) all imports of plants, cuttings, roots, bulbs, seeds, tubers, and other parts of plants intended for planting shall be fumigated.

The requisites for this cannot be detailed here, but broadly they consist of (1) a fumigating chamber in the most convenient place for treating all imports by sea; and (2) a smaller fumigating box for treating imports that arrive by post. . . .

It would be premature to make definite recommendations until we have data to go upon; I would suggest that the Customs Department be asked to collect information for one year; that this information be collected at all ports of entry and that this Department should be asked to state how it is possible to deal with imports through Mormugao or other foreign ports; and, finally, if there is any doubt as to the process to be employed and its effects on plants, that the small building erected at Pusa to fumigate our imports of fruit trees, etc., be utilised for experiment, the experiments being conducted by the officer who will have to carry out the treatment or initiate it, a Chemist, a Botanist, and an Entomologist together. I am unable to believe that a process which is so immensely employed in America, for instance, can fail in India; and if this process is adopted, the fumigation can be carried out by any officer in the Customs Department after instructions from the Agricultural Chemist of the province concerned and with his very occasional supervision. A periodical return will be required showing the imports which are fumigated. . . .

(Signed) H. M. LEFROY.

The 25th June 1907.

Copy of a letter, from the Imperial Entomologist, to the Director, Agricultural Research Institute, and Principal of the Agricultural College, Pusa, dated the 13th-20th May 1909.

I forward herewith in duplicate the report called for in connection with the treatment of plant imports. I recommend that it printed, with previous papers and the schedule of imports, and circulated for opinion. Provincial Economic Botanists might offer useful suggestions regarding the list of plants to be scheduled for fumigation. The tea, coffee, and fruit industries might offer opinions; and an expression of opinion from some of the important Botanical Gardens would be desirable, as they import plants and are likely to be the distributing centres for pests of certain classes. I would like to see these opinions as well as those of the Provincial Governments, Chambers of Commerce, and Customs authorities, and put up a final scheme based upon the whole available material. . . .

The returns obtained from the Customs Department enable me to finally deal with the whole question, and my recommendations are based on a consideration of (a) the insects that have been imported, (b) what are likely to be imported, (c) what the imports are, (d) the feasibility of carrying out any protective system without interference with trade. In dealing with this question, there are three points of view:—

(1) Are we to exclude possible pests of our staple crops grown in the plains?

(2) Are we also to take measures to exclude possible pests of tea, coffee, rubber, fruit, and such permanent crops as are grown mainly in the lower hills?

(3) Are we to exclude everything that could possibly injure in any way every form of vegetation, including roadside trees, garden plants, and every kind of plant grown or of value in the country?

I think the last is at this stage not necessary; if we are to exclude every possible insect destructive to all vegetation, then the measures must be very stringent and will cause much annoyance. The aim should be to exclude anything that might injure staple crops and to direct our measures also to the protection of the special permanent crops, such as tea, coffee, rubber and fruit. I have followed this principle. I have gone carefully over the imports of plants and have come to the following conclusions:—

(1) The import of fresh fruit, which includes apples, mangosteens, grapes, pine-apples, oranges, dates, pomegranates, and lemons for consumption, is likely to introduce only fruit fly, which can be prevented only by prohibiting importation altogether, which is impracticable. . . .

(2) *Vegetables, fresh*—include potatoes and onions so far as the returns show. With regard to potatoes, the mischief is done, and if I knew of any other pest liable of introduction with the tubers, I would prohibit importation. Potato moth is now widespread in India and there is no use prohibiting importation. Onions are probably safe to import for consumption.

(3) *Living green plants, cuttings, suckers, grafts, scions, etc.*—I would enforce fumigation with hydrocyanic acid against all portions of plants of kinds which are cultivated in this country, where such fumigation is likely to be effective. A large part of the imports are "living plants;" I would recommend that for every import a declaration of the species of plant be made and that the following be fumigated:—

Coffee, tea, rubber, citrus (orange, lime, Shaddock, sweet lime, etc.) apple, peach, litchi, date, mango, palms (all kinds), and any other fruit tree or permanent plant that is in cultivation in India . . .

It is useless to fumigate sugarcane, but I would prohibit their import wholly unless they are guaranteed free of insect pests by a competent authority at the country of origin. . . .

(4) *Bulbs, tubers, root stocks, and other underground plants.*—There is nothing dangerous in the returns, but I would recommend that for every importation a full list of species must be given prior to their being passed so that if a dangerous article was coming in, it would be dealt with the next time it was found. . . .

(5) *Seeds.*—I would not touch these at all, unless in special cases as was done with cotton seed. If every import is scheduled at the ports of entry and the schedule sent periodically to Pusa, there will be a sufficient safeguard.

The action to be taken that I recommend is as follows:—

(1) That details of every import of (a) fresh fruit, (b) fresh vegetables, (c) living green plants, cuttings, suckers, grafts, scions, etc., (d) bulbs, tubers, root stocks, rhizomes, and other underground parts of plants, (e) seeds be declared and recorded at every port of entry and a schedule sent quarterly showing for each import the number, package, how packed (e.g., in earth or moss, etc.), weight, kind, place despatched from, destination, value, and whether for consumption or planting. . . .

(2) That if in the opinion of the Imperial Entomologist any such imports are dangerous, he shall recommend to Government the method he considers suitable to meet such danger.

(3) That fumigation with hydrocyanic acid be applied at the port of entry to all imports classed as dangerous, which shall include any living parts of all plants cultivated in India intended for planting, excepting only seeds as per schedule below in Appendix B.

(4) That the schedule of dangerous imports shall be liable to revision from time to time and that additions to it be made by the Imperial Entomologist subject to revision afterwards by the Government of India or of the Government of the Province concerned, such changes being notified widely.

(5) That the above shall be applied to articles arriving by post or by steamer or other vessel.

These precautions will be effective only if the schedules are continually scrutinised by a competent authority, so that any new danger can be promptly and adequately met. It implies also constant watchfulness to know, as far as can be, what dangers there are to be guarded against; the spread of cultivation in East Africa, for instance, is certain to produce new pests of such crops as cotton; if trade with East Africa was to increase there might be a danger of their pests coming in, and this would be met by putting the dangerous import on the schedule for treatment. I think this is the most elastic and the least vexatious method to trade, while being a very safe one. In order to make this effective with the least possible delay, it is necessary that the quarterly schedule shall be referred to the advising authority at once so that Government may be advised and take action at once. It practically means that in India the Imperial Entomologist must exercise the powers given, in other countries, to the Chief Inspecting Officer, who can place on the list to be fumigated any dangerous import or who can take any other action authorised under the Act, in this case advising Government that the importation of any article is dangerous and is to be prohibited or permitted entry subject to certificate of freedom from disease. The important point is to make this procedure quick, as we are taking risks and if the schedule cannot be altered save by a reference through the Imperial Government to the Provincial Government, with a long delay, then the risks are very much intensified and it would be better to have a more rigid system. It is impossible, with the present staff, to have any system of inspection of imports, but we can scrutinise the schedules, watch the pests of foreign countries and the run of trade, and take precautions accordingly. I believe that the efficiency of this system depends entirely upon the powers given to the Imperial Entomologist subject to revision afterwards by Government.

In the above, I have considered Burma as a foreign country, as also Ceylon. Until we know more of the insect pests of Burma, it is impossible to advise regarding this country, and for India Burma must be treated as a foreign country. Ceylon also must be so treated and the precaution rigidly observed, as it is, from its trade position and climate, likely to be a distributing centre of tropical insect pests.

Suggestions dated 12—2—10 for the Control of Plant imports likely to introduce Plant Diseases into India by Dr. E. J. Butler, Imperial Mycologist, Pusa.

The question of the control of imports of plants or parts of plants likely to introduce fungus diseases into India, was considered under the heads of (a) Disinfection, (b) Quarantine and (c) Prohibition, in my note of July 15th, 1907, submitted to the Inspector General of Agriculture in India with the Director of Pusa's letter No. 2136, dated 17th July 1907.

Since then such returns as are available regarding the nature of the imports at the chief Indian ports have been furnished by the Collectors of Customs, and these permit of definite proposals being now submitted.

(a) *Disinfection.*—In my previous note, I gave reasons for believing that any method of disinfection carried out at the port of entry, without inspection by a professional Mycologist, would be of limited utility. From

the returns, it does not appear that any immediate measures in this direction are called for in the case of living plants or pests of plants fruits, vegetables, bulbs, tubers or other underground parts.

As regards seeds, taking into account all the conditions of the trade, disinfection is believed to be impracticable, except in the case of bulk seeds, such as cotton and linseed, for which it is not at present required.

Should there arise danger from any disease likely to be rendered innocuous by surface disinfection, of any of the above parts of plants, proposals will be submitted for the purpose.

(b) *Quarantine*.—For the reasons given in my previous note, and since there is no specific case disclosed by the returns calling for reconsideration, I do not recommend any quarantine measures.

(c) *Prohibition*.—As previously reported, it is on this that I would chiefly rely to keep out dangerous diseases. Practically all the British Colonies have taken action in recent years to prohibit either absolutely, or with certain limits and restrictions, the importation of dangerous plant diseases. I have before me a summary of the Legislative Regulations for this purpose of the Australian Commonwealth (Commonwealth Gazette of July 10th, 1909), New Zealand (Order in Council of February 20th, 1908), Transvaal (Gazettes of 28th May, 11th June and 20th August, 1909) Orange River Colony, Natal (Regulations in 1909 under the Proclamation No. 119 of 1906), Cape Colony (Proclamation No. 502 of 1906, and subsequent Regulations), Nyasaland (Gazette of April 30th, 1909), Federated Malay States (Ordinance No. XIII of 1908), Malta (Government Notice No. 21, January 20th, 1609), Guernsey (Ordinance of September 7th, 1909), and several other Colonies. The Home Government have similarly taken steps under the Destructive Insects and Pests Acts, 1877 and 1907 to prohibit or control the introduction of certain dangerous plants. It is probable, from what I have ascertained, that India is the only considerable part of the Empire where such regulations are not in force.

In proposing restrictive measures against the importation of certain dangerous plants I have considered carefully :—

(1) The diseases of important cultivated crops (including "Planters' Crops") which are likely to be introduced, and which are not known to exist in India.

(2) The information regarding the nature, quantity and origin of the imports available from the returns furnished by the Collectors of Customs.

(3) The effect on trade of any restrictive measures on imports.

(4) Any hardship or disadvantage to cultivators or planters in the measures proposed.

Taking (1) and (2) together, it appears that there are four important crops threatened with serious disease from outside India. These are Potato, Sugar-cane, Flax (including Linseed) and Coffee. Considered from the trade and cultivator's points of view, it is probable that total prohibition in any case, even if limited to certain countries, might cause hardship.

I therefore recommend that the four plants or parts of plants specified below . . . be permitted to be introduced to India only under the restrictions and safeguards mentioned under each.

The question of providing in future for prompt action in dealing with plant imports of a dangerous nature has been fully dealt with in Mr. Lefroy's note. The quarterly schedule showing the details of each kind of import will be sufficient to enable this Laboratory

to become acquainted with any new danger and to propose additions to the schedule of dangerous imports and measures for their control. It is, of course, essential that any restrictions proposed should be given effect to with the least possible delay. I would again emphasise the necessity referred to in paragraph 9 of my previous note, and in paragraph 2 of Mr. Lefroy's Report, of being in a position to receive information regarding the outbreak of plant diseases in other countries, promptly, and suggest that the British representatives at the International Agricultural Institute at Rome be asked to support the early formation of the section for the notification of diseases of plants which is to be founded in connection with the Institute.

[Finally, the Imperial Entomologist and the Imperial Mycologist combined in the form given below their respective schedules of dangerous plants the importation of which into India should be controlled].

SCHEDULE OF DANGEROUS PLANTS.

All living plants, parts of plants, cuttings, roots, scions, grafts, buds, or any other living part, *excepting only seeds, and fruits intended for consumption*, of the following plants are admitted subject only to fumigation with Hydrocyanic Acid:—

Tea, rubber (Ceará, Pará, ficus, or any other kind), citrus (orange, lime, lemon, shaddock, sweet lime and all other varieties), mango, lichi, apple, pear, plum, peach, apricot, guava, grape-vine, date, palms (all kinds), figs, pomegranates, indigo, cotton.

Coffee except from the New World (including South America and the West Indies) which is limited to importations made by the Department of Agriculture under such precautionary measures as it may deem necessary.

The imports of the following plants or parts of plants are absolutely prohibited except under the conditions mentioned under each.

(a). Potatoes, whether for planting or consumption from Great Britain, Italy, Germany, Scandinavia, France and Austria-Hungary, unless accompanied by:—

(1) A certificate from the consignor stating fully in what country and district of that country the potatoes were grown, and guaranteeing that "*warty disease*" was not known to exist on the farms where the potatoes were grown, and

(2) A certificate from an officer of the Board or Ministry of Agriculture or other similar Government Department of that country, to the effect that "*warty disease*" (black scap, cauliflower disease or canker), caused by *Chrysomya endobiotica*, Schilb., has not been declared to exist in that district.

(b). Sugarcane for planting, from any country, without a license from the Department of Agriculture in India, which will not be granted unless supported by a certificate signed by a competent authority (who will be in most cases an officer of the Agricultural Department of the country of origin) that it is free from root disease (any form), pine-apple disease (*Thielaviopsis ethacetica*), "Sereh" and gummosis.

(c). Flax seed, except under a license from the Department of Agriculture which must be provided to the Collector of Customs by the consignee. This license will be granted on the Department satisfying itself that the seed has been obtained through well-known and reliable seed merchants and has been guaranteed free from dodder.

(d). Cotton-seed, for whatever purpose, is admitted only subject to fumigation with Carbon-bisulphide.

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(INCORPORATED.)

The Scientific Officer.

Mr. R. D. Anstead, B.A., leaves for Coorg this evening, and expects to spend about a week in South Coorg and another week in North Coorg.

He should be back at headquarters about a fortnight hence.

If the coffee crop is sufficiently advanced, Mr. Anstead will avail himself of the present opportunity to investigate curing processes. If actual curing work has not been commenced before his return, he will arrange to make a special visit to Hunsur later for the purpose of seeing the various operations.

During the early part of December Mr. Anstead will visit estates in South Mysore.

The Planting Expert is now visiting the various districts for the second time, and he will, as usual, write reports on his tours in the "P. C." He desires that these reports shall be considered as continuations of his reports on his former tours, and suggests that planters interested would do well to refresh their memories by re-reading the former report on their district before attacking the second series.

Indian Tea and Its Rivals.

With reference to the letter from Mr. A. E. Duchesne published in Vol. V, No. 38, p. 493 it may be noted that the defect to which attention was called in an earlier issue of this paper (p. 400) has been rectified, and that the name of the Indian Tea Association, London, is now mentioned in advertisements regarding "Pure Indian Tea" in England. The earlier omission, made "of set purpose," appears to have been ill-advised. "Indiscriminate assistance to the trade" has not been advocated by this paper, and Mr. Duchesne's efforts have, as he points out, been restricted by financial limitations; but when he states that he had at first to confine his efforts to those grocers with whom he was in actual contact and that these "number some 300," it is obvious that not much good could be done without a great expansion of scope. That the number is "continually increasing" is satisfactory; but it will have to be multiplied many times before even the fringe of the retail trade in the United Kingdom can be said to have been handled; for the number of grocers there can scarcely be reckoned by *hundreds*.

It is satisfactory to know that in at least one quarter "Nilgiri Tea" is being specifically offered—"Direct from the Tea Gardens to the Tea Cup." This is guaranteed to be unmixed. It would be interesting to know how

this venture is progressing. For, in England, widespread representations have been made to the effect that Indian Teas *must be blended*. There are many of them that would certainly require no blending whatever to suit the taste of many thousands of British consumers; but the great tea blenders in England prefer not to encourage the sale of "straight" teas.

The opinion may be hazarded that many *South Indian* teas, in particular, do not require blending in order to find a good demand in the United Kingdom. There might be some difficulty in securing sufficiently large "breaks" or maintaining uniformity of quality when offering "pure South Indian Tea," but difficulties of this kind are apt to be over-rated until they are faced boldly, with a determination that they shall be surmounted.

"A Few Facts about Indian Tea," Sir James Buckingham's *brochure*, of which Mr. Duchesne has kindly sent out a copy, is an interesting little publication, pleasingly illustrated.

The International Rubber Exhibition, 1911.

Donations to the extent of Rs.1,153-11-6 have been remitted by the Malabar Coast Planters' Association. This is a good beginning.

Proceedings reported in the current issue show that the idea of subscriptions on an acreage basis has been accepted fairly generally; and there appears to be little doubt that the whole of the funds needed will be forthcoming in good time.

The Hon'ble Mr. J. G. Hamilton is the first to submit a sketch history of Rubber cultivation in his district. It is hoped that the other planters who have kindly promised to contribute towards the proposed booklet will send in their MSS. at an early date. Not only has the South India booklet to be compiled, but a summarised account is wanted for the Official Guide to the Exhibition, as mentioned in *P. C.*, Vol. V, No. 39, p. 500.

No photographs have been received yet.

Proposed Bonus on Green Tea.

With reference to a recent resolution of the Central Travancore Planters' Association (*P. C.*, Vol. 5, No. 40, p. 518) Mr. George Romilly writes that Mr. A. D. Jackson, the representative of the Madras Chamber of Commerce, and Mr. Romilly himself propose to attend the meeting of the Indian Tea Cess Committee in January next. Mr. Jackson has already written up to the Committee supporting the request of the U. P. A. S. I. concerning resumption of payment of bonus on Green Teas.

Soil Analyses.

Mr. W. H. Harrison, M. Sc., Madras Agricultural Chemist at the College of Agriculture and Research, Coimbatore, has stated that he is only empowered to analyse samples for cultivators whose estates are in the Madras Presidency.

This is mentioned so that planters in Native States may avoid delay by abstaining from asking Mr. Harrison to analyse soils, &c., for them.

Tea, and Speculation.

A London correspondent wrote lately :—

"Rubber share speculation is again on the decline, and preparations are being made to switch speculative energy to tea shares. A number of important Ceylon tea prospectuses are in process of preparation."

No "Tea boom" has followed, but undoubtedly a feeling of increased confidence in the tea-growing industry is manifested on the London Stock Exchange, and if there is any tea planter in South India who desires to realise he should be on the alert.

Scientific Officer's Papers**XLIV.—SECOND TOUR IN MUNDAKAYAM.**

On 20 September I reached Teekoy Estate and began a Second tour in Mundakayam. My first tour in the district was made in April 1910, and since then tapping operations have been begun on several estates, and generally speaking good results are being obtained and matters are quite satisfactory.

I do not think enough attention is paid to sanitation and cleanliness in tapping operations. If good rubber is to be made this is essential. Tapping knives should be brought in and sterilised with boiling water, or a disinfectant like permanganate of potash, at least once a week.

The cups and pails should also be kept scrupulously clean and they should be boiled and scalded frequently, and the metal channels at the base of the tree should also be kept clean. Spotted and discoloured biscuits are frequently shown me, and these are probably due to dirty cups or pails. (See *P. C.*, Vol. V/1, p. 201. Note 36).

While on the subject of tapping, I would point out that the tapping knives should be kept sharp. It is impossible to do good tapping work with a blunt knife. The fact of the matter is, locally made knives are being used, and these are made of inferior steel which will not keep a keen edge; and this is false economy.

Yet another grumble! When herringbone tapping is done a guide line should be marked on the tree and the cuts kept strictly parallel with the original marking. Where no guide line is used there is a tendency for the tappers to make the cut steeper and steeper. This means that the bark is being pared too thickly near the main channel, and when the cuts meet, a V-shaped piece of bark will be left which will be wasted.

The tapping on the whole is good, and the coolies are rapidly learning the work. Cambium cuts are, I notice, of rare occurrence, but when they are made they should be reported and corrected by the Superintendent or some skilled tapper before the tree is tapped again.

On 24 September I attended an Extraordinary General Meeting of the Mundakayam Planters' Association at which an Experiment Committee was elected and a series of experiments arranged. These deal chiefly with the use of green dressings in young Rubber, and the effect of manures on increase of girth and increase of latex yield.

My sincere thanks are due to the Chairman of the Mundakayam Rubber Planters' Association, and the planters in the district for their hospitality and kindness.

RUDOLPH D. ANSTEAD, *Planting Expert.*

RUBBER NOTES.

Effect of Hurricanes.—Mr. Everard Im Thurn, in his report of the hurricane which struck Fiji in March, 1910, writes:—

"I had always supposed that the one danger which would probably attend rubber growing in Fiji would be the breaking of these somewhat brittle trees by hurricane winds. I am glad therefore to report that our young rubber trees suffered very little on the occasion of the recent blow. The leaves, as was practically the case with all leaves throughout the storm area, were entirely stripped, but the branches, probably because of the stripping of the leaves and the main-stems, were very little broken. It is remarkable though I am not satisfied that any sequence of cause and effect is thereby indicated that almost the only rubber trees which were broken were certain trees at the Government Station at Nasimu, which had been tapped at an early stage of their growth. This treatment resulted in an increase in the size of their heads as well as of these stems and possibly a correlative greater liability to damage from wind.

Notes and Comments by the Scientific Officer.

[*Errata*.—A misprint in the "Contents" of Vol. V, No. 33, where Note 69 was referred to as Note 68, led to a mistake in Vol. V. No. 37 (October 1, 1910) where Nos. 69 and 70 were used in connection with Notes that should have been numbered **70** and **71**, respectively. Planters are requested to make the necessary alteration on p. 474, so that the Notes may be as follows :—

No. 70 Lime.

No. 71 Crude Oil Emulsion.

Any future references to these Notes will give *the correct numbers as above.*]

72. *Canker on Pará Rubber*.—My attention has lately been drawn for the first time to cases of Canker on Pará Rubber. There are two kinds of disease described popularly as Canker. One produces a spot which bleeds and exudes gum and latex; this, however, I have not yet met with in India and so it need not be dealt with further here. The disease in question was described some time ago by Mr. Petch in his usual lucid way, and so I make no apology for quoting him verbatim :

"It has been determined that in many cases, probably in the majority of cases, the death of the bark in patches after the tree has been scraped before tapping is due to 'Canker,' sometimes assisted by deeper scraping than should be allowed. But the most general symptoms exhibited during the current year differ completely from those previously recorded. The disease attacked the renewing bark on the surface which was being tapped. The bark showed numerous vertical black lines, and on cutting it out these lines were found to extend into the wood. These black lines may be found on the cambium before they are evident externally. The bark round these lines decays, leaving a narrow vertical wound. Sometimes adjacent patches coalesce, and the whole of the renewing bark decays. In most cases the disease does not extend downwards as rapidly as the bark is excised during the tapping, and it is therefore possible to continue tapping, although the tree is diseased. With the advent of drier weather the disease stops and the bark renews over the wounds, but as it has to grow in from the edges of the vertical wounds, the renewed bark is rough. Except for this rough bark, there is no permanent injury to the tree."

This exactly describes the appearance of the disease as it was shown to me. The exact cause of this Canker is not yet fully determined, but it is very probably due to Bacteria. The best plan appears to be to let it alone, and adopt preventive measures in the future.

Since writing the above I have received a copy of a report on an examination of a specimen of this disease which Mr. Petch has most kindly made for us. Mr. Petch says, "It is what I described as canker on the tapping cuts in the *Tropical Agriculturist* last year, but I have been working at Hevea canker the greater part of this year and have come to the conclusion that it has no connection with the real canker. I doubt whether it is more than the effect of rain on the exposed bark, and, at present, the best thing seems to be to leave it alone."

This being the case it is advisable to do all the making of new trees in the dry weather so that the bark may heal and harden before the monsoon, since in the majority of cases the disease occurred on the marking cuts.

RUDOLPH D. ANSTEAD, *Planting Expert*,

DISTRICT PLANTERS' ASSOCIATIONS.**Shevaroy Planters' Association.**

Proceedings of a Special General Meeting held in Yercaud, Victoria Rooms, on 10th October, 1910.

PRESENT.—Messrs. S. Campbell, J. C. Cobbe, B. Cayley, R. Gompertz, S. M. Hight, W. Hight, E. Large, W. I. Lechler, C. G. Lechler, A. B. Kundaswamy, C. Rahm, L. E. T. Short, G. Turner, Revd. —Rochet, and Ch. Dickins (Hon. Secretary and Chairman.)

Notice calling the Meeting.—The Honorary Secretary informed the meeting that a printed notice had been sent by post to every member of the Association—calling the above meeting—10 days before the time. The following subjects were on the Agenda Paper (1) Cart Rates, (2) Experiment Plots, (3) Raised rates of wages for resident labour. The sense of the meeting having been taken, it was decided to discuss subject 3, as being the most important.

Raised rates for resident labour.—Read letter dated 21/9/10 from Mr. A. G. Nicholson informing the Association that he had raised rates for Resident labour only as follows:—Selected young, strong, hard working men 4 annas. Selected young, strong hard working women 3 annas per day. After a long discussion the following resolution was proposed by Mr. G. Turner and seconded by Mr. B. Cayley and carried *nem. con*:—

“That in the opinion of this Association the time has come to raise the rates of the labourer *resident on the Estate* as tending to induce a better class of labourer to work on estates, and it is resolved that the maximum rate to be paid to a man be 4 annas and to a woman 3 annas per day of work.”

And also the following resolution with reference to time of payment—proposed by Mr. G. Turner and seconded by Mr. C. G. Lechler, and carried *nem. con*:—“That in the opinion of this Association and in consideration of the higher rate offered to the labourer it is now desirable that planters on these Hills pay up their coolies not oftener than once a month instead of once a week—as tending to being a means of securing a greater hold upon the cooly than at present.”

It being late, and some of the members having other meetings to attend, a resolution was passed postponing the discussion of subjects 1 and 2 on the Agenda Paper to the next Committee Meeting early in November.

(Signed). CHAS. DICKINS,
Honorary Secretary, S. P. A.

Central Travancore Planters' Association.

Proceedings of the third quarterly meeting, held at Penthurst Bungalow on Saturday, October 8th, 1910.

PRESENT:—W. H. G. Leahy (Chairman), F. Bissett, E. S. Stephens, R. P. Roissier, T. A. Kinmond, J. A. Richardson, R. A. St. George (visitor), E. C. Sylvester, J. S. Wilkie, T. A. Vernon, J. F. Fraser, J. H. Cantlay, D. McArthur, and H. C. Westaway (Honorary Secretary).

The Chairman called upon the Honorary Secretary to read the notice calling the meeting, after which the minutes of the previous meeting were taken as read and confirmed.

Correspondence.—Read letter No. 43/10 from Secretary, U.P.A.S.I., *re* proposed green tea bonus, when it was proposed by Mr. Richardson and seconded by Mr. Fraser: "That Mr. Romilly be asked to personally push the matter of the proposed green tea bonus at the half yearly meeting of the Indian Tea Association to be held in January."—Carried unanimously.

Read letters Nos. 41/10, 39/10, 37/10 and 36/10 from Secretary, U.P.A.S.I.

Read letters dated the 26th September and 30th September from Mr. J. A. Richardson. The members had no suggestions to make *re* the proposed Rubber Stealing Regulation.

It was proposed by the Honorary Secretary, seconded by Mr. J. A. Richardson: "That Mr. Leahy be asked to draw up the brief for Sir J. D. Rees *re* the Ceylon Tea Duty. Carried unanimously. This Mr. Leahy said he would kindly do.

Read letters dated 19-9-10 and 26-9-10 from Mr. J. A. Richardson.

Read letter, dated 1-10-10, from the Honorary Secretary, South Travancore Planters Association. Resolved: "That this Association will support them after hearing what further steps they propose taking in the matter."—Carried unanimously.

Read letters dated 14th and 16th September from Mr. P.K. Padmanabha Pillay. Resolved: "That a copy of these be circulated to the Kanan Devan Hills P. A., the South Travancore P. A., the Mundakayam Rubber P. A., and the Malabar Coast P. A., for their information."—Carried unanimously.

Read letter No. 357 from Divisional Forest Officer, High Range Division, dated 30-9-10. Resolved that the Honorary Secretary do write saying that it is this Association's opinion that 5 lbs. of dry firewood is sufficient to dry 1 lb. of made tea, that no fuel is required for curing coffee, and that they are not in a position to say how much firewood is required for drying one pound of rubber.

Read letter No. 1515, dated 20-9-10, from Division Officer, P.W.D. Kottayam. Resolved: That the Hon. Secretary do write and inform the Chief Engineer that the Planters and Estates concerned in the up-keep of the grant-in-aid roads, are individually prepared to sign the necessary contract for the grants, with the exception of the Ladrum-Kuduakarnom grant-in-aid road, unless some special allowance is given to put it in thorough repair. That the Chief Engineer's attention be drawn to the state of this road, and point out that the present grant is quite inadequate to keep the road in serviceable condition, and that it is believed a special grant has been recommended for this purpose.

Read letters No. 402, dated 9-9-10, and 393, dated 5-9-10, from Section Officer, P.W.D.

Read letter No. 5611 from Chief Secretary to Government, dated 26-8-10. Resolved: "That as this concerns Messrs. McArthur and Wolde they be asked to draft a letter which the Honorary Secretary might forward to Government."

Read letter from Messrs. Aspinwall & Co. *re* importation of liquor in casks.

European Doctor Scheme.—Chairman:—"Gentlemen, we will now go through the rules as drawn up by the joint Committee, and I think this would best be in Committee." The rules were then discussed one by one and with one or two amendments were adopted. Chairman:—"Gentlemen, you have all heard these rules read and discussed. Is every one in favour of these as now amended?"—Carried unanimously.

It was resolved that Messrs. Leahy, Bissett, and Westaway be the Medical Fund Committee for Peermade.

International Rubber Exhibition, 1911.—Read letters No. 44/10 40/10 and 38/10 from Secretary, U.P.A.S.I. Proposed by Mr. McArthur and seconded by the Honorary Secretary: "That the Estates in this District interested in Rubber subscribe at the rate of 4 annas per acre on their Rubber acreage to the International Rubber Exhibition to be held in London 1911."—Carried unanimously.

Amendment to the Breach of Contract Act.—Read letters from Mr. J. A. Richardson and Mr. J. J. Murphy. It was resolved to await the publication of the amendment before instructing the Planting Member of Council.

BANGALORE DELEGATE'S REPORT.

As it is usual for the Bangalore Delegate to render an account of his stewardship, I will briefly allude to the various subjects discussed which I think interest us. The meeting was well attended, was full of interest, and lasted for five full days.

King Edward Memorial Fund.—This was brought up by the Planting member, and I seconded the Mundakayam Delegate's resolution to refer the matter to District Associations. You will be aware we decided at our last meeting to raise subscriptions and forward same to the Madras Committee.

Cattle Diseases.—A resolution was passed thanking Government for appointing Veterinary Assistants for inoculating cattle against anthrax and rinderpest; it was also suggested that measures should be taken by Government for the destruction of carcasses of animals which may die of infectious diseases on the Main Roads. It would be as well perhaps if we suggested the same to the Travancore Government in view of the bitter experience we had in 1908 from a severe outbreak of rinderpest in this District and amongst the Kottayam bandy bulls.

Act I. of 1903. Mr. Abbott's resolution was unanimously carried, that this subject should not be discussed at future U.P.A.S.I. meetings unless 30 days notice was given.

Scientific Officer's Laboratory.—It was decided that a Laboratory, etc., was absolutely necessary for the work of the Scientific Officer, and in accordance with your instructions I promised a donation of Rs.200 towards the initial cost and Rs.50 for five years towards the up-keep on behalf of the Association. Most of the other Associations promised like amounts, and so the necessary amount was raised in the room.

Experimental Plots.—You will have read the special Committee's report *re* this, and one of its recommendations was that each District Association should arrange for definite areas for experiments. It is for you to say what this Association will do.

Pest Act.—This was discussed at some length, and it was decided to approach the Government through the Planting Member with a view to having a Pest Act passed. We were told how successful such Acts were in other countries, but it seems that unless Government and all European and Native proprietors agree to joint action in remedial measures on lands which adjoin each other, an Act is useless and unworkable and may be more a curse than a blessing.

Green Tea Bonus.—I voted for the Wynaad Delegate's resolution asking the Cess Committee to allot funds for a bonus of 6 pies per lb. on 4 million lbs. of green tea, which was carried, and the amendment against the bonus put by the Nilgiri Delegate was lost.

Ceylon Import Duty on Tea.—The resolution I put to the meeting was unanimously carried, and we trust Sir J. D. Rees, M. P., will be able to

help us to have this objectionable and unreasonable tax removed by venting our grievance in the House.

Planters' Benevolent Fund.—Some of the old rules have been dropped and others altered, and I am certain the amended rules will meet with your approval. The new book of rules has been posted to members, who will be able to compare the two books and note the alterations.

Labour Supply and Emigration.—A special Committee was appointed to investigate and report on fresh sources of supply. The 1908 special Committee's report is now published, and copies may be obtained from the Honorary Secretary. With regard to emigration Mr. Aylmer Martin gave us some interesting information and figures, and his resolution asking Government to pass an Act for the better protection of emigrants and the attestation of agreements, etc., etc., was passed by the meeting. If you will allow me, I should like to say a few words on this subject. While quite approving of Mr. Aylmer Martin's resolution, which I supported, I am afraid Government will not do anything for us in the near future, and there are pessimists who have told the meeting at Bangalore that Government will not touch any questions dealing with labour until we all take Act I of 1903. I am afraid we place too much reliance on Government, when we pass resolutions asking for assistance. The question naturally arises, can we not ourselves do something to discourage emigration to Ceylon and other countries? Can we not do what Ceylon has been and is doing now? I think we can. By our apathy and want of enterprise we are allowing the grass to grow under our feet, and for the matter of that under our cultivation too! You will have seen in the papers lately an English translation of the inducements, or rather the allurements, offered to South Indian coolies to go to Ceylon issued by the Ceylon Labour Commissioner, and which are in the way of notices printed in the vernacular. In them the cooly is told of the good climate, good wages, free housing, and free medical attendance, and in some cases free passages across, etc.

These notices are distributed broadcast all over South Indian recruiting grounds. I would suggest a counterblast to this in the way of similar notices, telling the cooly not to believe everything the native recruiting agent tells him, as the agent is paid high commission for each cooly he catches, whether for Ceylon or elsewhere, and his promises end there, and he does not care what happens afterwards to the cooly. That there is plenty of work in South Indian paddy fields, etc., and that on Estates the climate and wages are just as good as in Ceylon or elsewhere, that free housing and medical treatment is provided, that living is much cheaper for them in Southern India than in Ceylon or elsewhere, that several Estates pay railway fares and road expenses and besides give a bonus after a year's stay, that they are not told any of the disadvantages of emigrating by the native recruiters, such as returning coolies bringing back hardly any savings after a year or two years' absence, of the numbers of coolies imprisoned annually, especially in Ceylon, for deserting and refusing to work, and how their debts are increased by the borrowings of the Cangany from Chetties, and how they are hawked about on "Tundus" at the will and pleasure of the Cangany and Chetty. I do not say what I have about Ceylon in any acrimonious spirit, and I am sure we all admire the businesslike spirit of Ceylon Planters in voluntarily paying for a better supply of labour by the appointment of a Labour Commissioner in South India. It is surely an object lesson to us, and I ask why cannot the Planters of Southern India, who are all howling about the shortness of labour, take a page from the book of Ceylon enterprise? We were told by the Director General of Agriculture at the Bangalore meeting, when the question of labour supply was being discussed, that the native landed pro-

prietors were feeling the pinch quite as much as planters, and that lots of wet lands were lying idle in the Tanjore District, because of coolies emigrating. Here is our chance of co-operation with the big native landed proprietors, who, I am sure, would willingly join hands with us in checking the emigration of coolies by helping us to disseminate the notices advising coolies of the work to be had in Southern India paddy fields, etc., and on Estates, and of the disadvantages of emigrating. Such a scheme would not be expensive, as there would only be the cost of printing notices and posters which we would ask the big native landed proprietors to distribute throughout the country, and I would suggest that the special Committee appointed to investigate and report on fresh sources of supply should do the same on their travels and let funds be raised by all District Associations and be sent to the U. P. A. S. I., who should be asked to control the working of the scheme. Supposing, for argument's sake, we do not benefit ourselves so much as the native land owners by the scheme, you must not forget that the probability is the Native land owners are obliged now to draw on the supply of coolies who usually go to Estates; and how often does one hear the remark by Planters that "My old Canganies have failed to bring up coolies," and it is taken for granted by the Planter that the coolies have all gone to other countries. I venture to say this is not so. Even if the native landed proprietors benefit by our action, you must remember we shall be able to get the coolies between harvests and in slack times for at least three to six months. I am quite confident the big native land owners will help us to distribute our notices and posters, if we approach such influential men as Dewan Bahadur Raghunatha Row, of the Tanjore District, all native members of Council, and hundreds of other big landed proprietors in the Presidency, as they will see it will be as much to their benefit as ours and cost them nothing. We cannot but blame Government for their apathy in the matter, and for their short-sighted policy in allowing paddy fields to lie idle; it all comes back on Government, because if much land goes out of cultivation it means a remission of taxes by Government, and also means that rice and other food stuffs will go up in price. I throw out the above suggestions for the consideration of all Planters in South India, and think we should start some scheme to stop the present flow of labour outside S. India, which is due in a great measure to the allurements of native recruiters and the ignorance of the cooly.

Roads and Communications.--I seconded the resolution proposed by Mr. Aylmer Martin, thanking Government for sanctioning the Theni bridge, which we trust will be open for traffic in the near future, and the other resolution relating to the construction of Vaigay Valley Railway.

Before concluding this report I have to draw your attention to the very able, interesting, and instructive speeches by the Scientific Officer on Cultivation, Manure, etc., which will well repay perusal by you in the book of proceedings. An innovation at the meeting was the collection of leguminous plants, etc., from different Districts, and the Exhibition of samples of produce which were on show at the offices of the United Planters' Association of Southern India and which were of so much interest to all.

I apologise for taking up so much of your time, and if there is any other subject of interest to you which I have not touched on I shall be happy to give you any information.

With a vote of thanks to the chair the Meeting terminated.

(Signed) H. C. WESTAWAY,

Honorary Secretary.

Coorg Planters' Association.

Minutes of the Quarterly General Meeting, held at Bamboo Club House on 17th October, 1910.

PRESENT.—Messrs. J. A. Graham, W. R. Wright, E. M. Breithaupt, J. W. Finlayson, H. G. Grant, R. Hamilton, O. B. Achard, W. C. Petrie Hay, C. E. M. Browne, G. L. Newberry, G. C. Garrett, F. Macrae, P. G. Tipping, and by proxy Mr. W. A. F. Bracken, Dr. Hiley, Hony : Member, and visitors Messrs. Waymouth, Thwaites, and Egerton.

Read letter from Mr. Murray-Aynsley, the President, expressing his regret at being unable to attend the Meeting.

Dr. Hiley was elected an Hony : Member.

The Secretary then read a short report of Delegates to the recent U.P.A. Meeting held at Bangalore.

REPORT OF THE DELEGATES TO THE U.P.A. MEETING AT BANGALORE, AUGUST 1910.

To the C.P.A.

Gentlemen,

Your Delegates, Messrs. Murray-Aynsley and R. D. Tipping, represented you at the recent U.P.A. Meeting in Bangalore, and now lay before you their report.

It is not proposed to enter into details of the whole of the business transacted at the meeting, with which you have had opportunities of becoming conversant through the medium of the Press. We shall therefore only touch on the subjects which are of especial interest to this Province. Taking these in the order they were brought up at the Meeting, we wish to place on record our appreciation of the useful work that has been done by our Planting Member of Council, the Hon'ble Mr. J. G. Hamilton, who has missed no opportunity of furthering the interests of the Planting Community, and has not spared himself when hard work was to be done, his advice, and assistance at our late U. P. A meeting having proved invaluable to many of us. The Scientific Officer's Report shows us the good work he has accomplished in the past year, which has been one of hard work and little relaxation. We hope shortly to welcome him to Coorg, when we must endeavour to make his labours as pleasant as possible.

In this connection your Delegates promised on behalf of our Association a sum of Rs.200 to 250 towards the Rs.2,500 required for the Scientific Officer's Laboratory and outfit. It was absolutely essential that the matter should be settled at the U.P.A. Meeting, and your Delegates will ask you to confirm their action in this matter. It will be noted that the Sc. O. has arranged for the establishment of experimental plots in each of the Districts with which he is connected, and you will be asked to arrange for the carrying out of such experiments as are deemed to be most suitable in Coorg.

Pepper Vine Disease.—This subject was brought up, and it was recognised that full advantage should be taken of the expert advice at our disposal, in combating this disease before it becomes the scourge it has done in some Districts. The hearty thanks of the U.P.A. were tendered to the Government of India for the services of Mr. McRae, the Officiating Imperial Mycologist.

The King Edward Memorial.—It was resolved that this matter should be referred to the District Associations, and whilst it was pointed that a number of planters had subscribed to this outside the Association, there

were probably some who wished to send their subscriptions through the U. P. A.

Cattle Diseases.—A resolution was passed thanking Government for their assistance in affording facilities for inoculation against rinderpest, through their Vety : Department, and a request was made that steps might be taken for the destruction of the carcasses of animals which die of infectious diseases on the main roads.

The Labour Acts.—It was resolved that this question shall in future be omitted from the Agenda Paper except in the case of a proposition on the subject being notified in accordance with Rule X of the U. P. A.

Prevention of Thefts of Produce.—Your Delegates brought forward this subject, and a resolution was passed as follows :—

“That in view of the increasing production of Rubber, Tea, Pepper and Cardamoms in Southern India it is considered advisable to ask Government to pass some enactment for the protection of these products from theft both on the Plantations and in transit to the Coast, an enactment similar to the Coffee-Stealing Prevention Act being considered suitable,” and a Committee was formed to deal with this subject, before it was finally brought before the Government of Madras.

The question of a Railway to the West Coast was once more brought forward, and Mr. Parsons in an eloquent speech advocated the claims, and pointed out the advantages, of a railway through Coorg; but in spite of all that was urged in its favour, the reply we receive was not encouraging. As the matter concerns Coorg especially, I will read you what the Hon'ble Mr. Stuart Fraser said on the subject.

Cess on Coffee Exported from India.—This matter was brought up by your Delegates, and a resolution was passed as follows :—“That in view of the letter dated 16th December from the Secretary to the Government of Madras, Revenue Department, which reads as follows:—‘In continuation of Mr. Wynch's letter No. 2880 dated 20th October 1909 informing you that your letter of the 5th idem containing the representations of the Association on the subject of the levy of a cess on Coffee exported from country has been forwarded to the Government of India, I am directed to request that you will be good enough to furnish evidence that the Association's proposals in favour of a cess on Coffee, command the approval and support of the bulk of the Coffee Planters of Southern India, whose produce would be affected by it. The Association may perhaps be unable to give complete statistics of the Coffee-producing area under cultivation, but some approximate figures proving that the demand for a Coffee cess has the support of a very decided majority of Coffee planters, whether Members of the United Planters' Association of Southern India or not, are necessary before His Excellency in Council could give the proposal his support;’ Secretaries of District Associations be requested to send in at an early date the statistics called for by Government to the Secretary, U.P.A., who is requested to submit these figures to Government together with a reiteration of our reasons for asking for this cess, and that the Planting Member of Council be asked to press this subject on the attention of the Government with a view to the cess being imposed at an early date.”

Planters' Benevolent Fund.—Progress has been made towards placing this Fund on a satisfactory basis, but there are still a number who have not supported it, and in view of the worthy of object of this Fund, all who are in a position to do so are once more asked to subscribe.

The Planters' Chronicle.—All who read this little publication cannot fail to recognise its usefulness as a medium of affording the latest informa-

tion on Planting subjects as well as for the purpose of advertisements, and in this connection, it is mentioned that if planters would make more frequent use of its pages for the latter purpose, it would greatly assist the finances of the paper, which at present is supplied free of cost to all members of District Associations. Suitable contributions on planting subjects are always welcome, and planters are invited to assist in this way.

International Rubber Exhibition in London 1911.—It was resolved to show exhibits from Southern India. Funds to the extent of £500, approximately, were needed to secure the necessary space and make a suitable show.

With a view to this, a Committee was appointed to undertake the necessary arrangements, and Mr. Richardson kindly consented to act as Delegate to the Exhibition.

Since then it was found that a subscription on all areas under Rubber in S. India (which total approximately 30,000 acres) of 4 as. per acre would be required, and as the Funds are needed at once, it is necessary to send in subscriptions as early as possible.

Messrs. Rowe, White & Co., Ltd., of London, have secured the required space in the Exhibition Building, and have kindly consented to act as agents, whilst Messrs. Peirce, Leslie & Co., Ltd., have been good enough to promise to collect and forward the Exhibits which are sent through them free of commission.

It is proposed to distribute in pamphlet form, a short description, with suitable photos., of each of the Rubber Districts in Southern India with a view to making this new industry better known to the public.

The subject of the reduction of Curing Charges on coffee was once more discussed, and a resolution was passed in the following words :—"That Coffee Curers be once more approached with a view to their further reducing the charges and bringing them into line with the terms offered by Messrs. Volkart Brothers and that they be asked whether they cannot make improvements in the curing machinery in the event of their being unable to make a reduction."

Programme of the Scientific Officer's Tour in Coorg was discussed, and it was resolved to settle final details at a Committee Meeting on Wednesday, 19th. Mr. Anstead is expected to arrive at Pollibetta on the 23rd.

Experimental Plots.—This question was also left to the Committee, whose proposals will be laid before Mr. Anstead, on his arrival, for approval.

Mr. Jackson in this connection intimated that he had some Coffee Hybrids of the 7th generation, and expressed his willingness to give any assistance in his power, for which he was thanked.

The Protection of Produce from Theft.—This question was discussed especially with reference to Rubber and Pepper, and it was resolved to support the proposals regarding Rubber and to submit to the Secretary, U. P. A., the views of this Association regarding the protection of Pepper. The Resolution passed at the last Meeting, "that in future the cess per acre shall be at the rate of 1 anna 6 pies" was confirmed, and it was resolved "that one vote for every Rs.12 subscribed shall in future be allowed."

This was proposed by Mr. P. G. Tipping and seconded by Mr. F. Macrae, and carried *nem. con.*

The Scientific Officer's Laboratory Fund.—This matter was explained by the Secretary, and it was resolved to collect the sum necessary

from proprietors on a basis of the area under cultivation; Rs.150 having already been remitted by the Secretary, as funds were required immediately to meet the expenses of the outfit which had been ordered by cable, and was expected very shortly,

International Rubber Exhibition, 1911, in London.—The Secretary explained the objects of the fund which was being raised, and pointed out that a cess of 4 annas per acre under Rubber cultivation would probably raise the required sum. As those chiefly interested in Rubber in Coorg intended to subscribe, no resolution was passed on the subject, but other members interested were invited to subscribe.

The question of the proposed Sidapur-Sunticoppa Road was brought up, and a number of letters on the subject were laid on the table. It was decided that, as those interested in this road were chiefly N. Coorg planters, of whom only two were present, those members in North Coorg who were sufficiently interested might call a meeting and come to a decision, the South Coorg members not being in a position to give an opinion.

A letter from the Assistant Superintendent of Police was read, and the Secretary was instructed to write thanking him for having acceded to the request of the Association in arranging for a suitable Police force to guard the Perimbady Ghat road during the busy season.

Read letter from Mr. A. B. Chengappa, regarding the inconvenience of having to appear before the District Magistrate to obtain warrants for Breach of Contract, where Yerawars and Kurumbars are the offenders. Resolved that the Secretary make inquiries as to the reasons for this procedure.

Local Fund Roads.—Mr. A. H. Jackson, member of the L. F. Board, read a letter from the Executive Engineer regarding the establishment of Mile Coolies on the more important roads. It was noted with satisfaction that this was a step likely to lead to a permanent improvement in the roads.

The Minto Memorial Fund.—Papers relating to this were laid on the table.

King Edward Memorial Fund.—This subject was once more brought forward and members were asked to subscribe. •

The Fund for the Prevention of Thefts of Pepper.—After some discussion it was resolved: "That this Fund do cover rewards for the detection of thefts during the transport of the product to the consignees, as well as on the Estates where it is grown and cured." This was proposed by Mr. A. H. Jackson and seconded by Mr. P. G. Tipping.

Read letter from Government *re* the proposal to *control the import of plants*, grafts, seeds, &c., to prevent the introduction into this country of insect pests and fungoid diseases.

Resolved to go into this matter after getting the Sc. O's opinion on the subject.*

Prospectus of a proposed Motor Service between Mysore and Coorg was laid on the table, but as this Paper only reached the meeting very late the receipt of the proposal was merely recorded, and left for discussion later.

A vote of thanks to the Chair terminated the proceedings.

(Signed) R. D. TIPPING,

Honorary Secretary, C. P. A.

*[Since the above was written the pamphlet has been the subject of comment by Mr. Anstead, and his views have the attention of this Association.]

CORRESPONDENCE.**The New Manihot Rubbers.**

Mudigere, 18th October 1910.

Sir,—In reply to Mr. R. de R. Norman one of my earliest experiments was somewhat on the lines he suggests, and it failed as badly as others made at the same time. I now blame the seed.

I have just had 10% germinate in a fortnight after taking my own advice, and a few more seem to be coming on.

The Piauhyens's has stopped dead for the present at 1%.

JOHN G. HAMILTON.

Rubber Cultivation in Cochin-China.

M. Morange has sent the *Agricultural Bulletin of the Straits and Federated Malay States*, an interesting little paper on the cultivation of rubber in Cochin-China. The first plants were introduced to Saigon Gardens about 1880 and grew well, but disappeared in four or five years. In 1891 M. Seligmann, after travelling in the Malay Peninsula, brought some more but soon after these also disappeared. Finally, in the end of 1897, M. Raoul brought seeds from Ceylon, and they were established plants by 1899. At present there are about twenty-four plantations of different sized areas and more are being opened. There were in round numbers about 750,000 trees planted by December 31, and reckoning those which will be planted this year at 250,000, there should be a million trees in Cochin-China by the end of 1910.

The soil in many parts is good and the growth of the plants equal to that of Ceylon, but inferior to that of Malaya. This, suggests the author, is due to the absence of the continuous rains of the Malay Peninsula, for in Cochin-China there is a dry season of three or four months, from January to April.

The planters are quite up-to-date as to stumping the ground, using a stump extractor which is worked by six men and which removes 25 to 30 stumps of all sizes a day. The labour is chiefly Annamite, but Javanese have been imported. The first ton of Pará Rubber was exported from Saigon by M. Belland in 1908.

All the other well-known kinds of rubber have been tried, Rambong, Ceará Rubber, Castilloa, and Funtumia besides, but these have not given encouraging results. Jungle rubber from the forests is almost negligible and has never paid the natives to collect.

There is another article on the same subject by E. Deleurance, *Le Caoutchouc et la Gutta Percha*, in which the author considers Cochin-China a very suitable country for the cultivation. He considers the dry season of six months is advantageous in arresting the development of fungi. The young plants develop most rapidly in the early part of the dry season at the time that the adults shed their leaves and put out fresh buds. A concession of 16,000 trees near Saigon gave an average of 1 kil. 200 grams saleable rubber (about 2½ lbs.) a year.

The average returns of trees of different ages are given as

7th year	20% tapped gives	200 grammes
8th "	40% "	400 "
9th "	80% "	700 "
10th "	200% "	1 kilo

The cost of collection and preparation is given at 2 to 3 francs a kilo. One coolie can tap 150 trees.

COFFEE.

The Revival of Coffee Culture in Java.

(Specially translated for the *The Spice Mill*, from the *Kolonialwaren Zeitung*).

The island of Java was the first insular territory into which the coffee plant was introduced. This was in 1696, by a Dutchman, and it was planted experimentally. The experiment proved satisfactory, but a few years later the young plantation was destroyed by an earthquake. A further trial, in 1711, was, however, rewarded with permanent success, and the output increased, within the following 70 years, from 894 to 6,500,000 pounds. The Dutch Government having in the meantime taken up the cultivation on its own account, the Javanese were forced to do the work by compulsion and the exports increased in consequence, especially after the establishment of a number of private plantations, to an enormous extent.

Within comparatively recent years this cultivation underwent a complete change. While up to the year 1885 the average yield for the preceding five annual harvests had been between 800,000 and 1,000,000 piculs (1 picul=about 60 German pounds), it fell off in 1885 to 463,000, and after that gradually to 80,000 piculs, consequently barely one-tenth of the original production. The cause is to be sought in the leaf disease, which broke out in 1880 to 1890 and spread through the plantations. As may be imagined, everything possible was done to combat the ravages caused by this disease. The manner in which this was done and the extent to which it has proved successful were shown in a lecture delivered recently by the Director of Agriculture of the Dutch West Indies, at Gravenhagen, before the Dutch-Indian Society for Agriculture and Industry, on this subject, which was illustrated by stereopticon pictures.

The speaker first of all asserted, as a fact, that within the past few years a renewed interest had developed among planters to the island of Java in coffee cultivation, and that the preparation of new properties demonstrated that confidence in coffee culture was returning. He showed at the same time several views of Java coffee plantations affected by the leaf disease. Within recent years the leaf disease has also made its appearance in the plantations of *Liberia coffee*. In foreign possessions free Liberia plantations are still to be found, but in Java hardly any perfectly free Liberia plantations are to be found. Of these also the lecturer showed some stereopticon views.

Since 1900 a third variety of coffee, the *Robusta coffee*, has been cultivated. This was introduced towards the end of the 19th century in Africa and later also in Java. But little noticed at first, interest in it gradually increased at its great productiveness was recognized. It was then planted on a larger scale in Java, and it may be stated that on the private plantations hardly any Liberia and Java coffee is now planted; almost exclusively Robusta coffee is raised. The annual plantings are estimated at 15,000 trees. The advantages of the Robusta coffee consist in its early productiveness, its rapid growth, its great hardiness and the excellent ripenings of the berry. The lecturer was enabled, by the reproduction of a large number of photographs, to give an intelligible picture of the qualities of the Robusta coffee.

"But how does the Robusta coffee behave in regard to the leaf disease?" asked the speaker. "So far it has practically not suffered from it, but it is to be foreseen that this condition cannot exist for very much longer. We must make up our minds to the fact that the leaf disease will

acclimatize itself on the Robusta. This is, however, no reason for not planting it; on the contrary, with such a prospect in view, it should be as quickly and as plentifully planted as possible, so long as the conditions are favourable. As far as subsequent events are concerned we need not trouble ourselves about them, having already made our preparations to meet them.

"We must forthwith continue the fight against the leaf disease. Its direct opposition with the aid of Bordeaux mixture has proved practically impossible. The speaker has taken up a different position and has sought remedies that are a better help against the disease.

"Three different methods may be pursued to obtain this purpose."

As far as the introduction of new varieties is concerned the speaker enumerated a whole series of these new coffees and showed pictures of coffee *Caneophora*, coffee *Ugandca*, and coffee *Abeohutae*. All these varieties have their special merits and disadvantages; some are better adapted for a sandy, others flourish better on a loamy soil.

"Coffee *excelsa*, a variety resembling the Liberia coffee, is distinguished for its vegetative vigour; the trees, according to their discoverer, Chevalier, are described as attaining a height of 20 metres. Coffee *Congoueis*, a variety from the Congo land, appears, so far at least, to be completely immune against the leaf disease. It is admitted that in other respects this variety is not as well adapted for cultivation. But it is possible that by crossing it with another variety its immunity may be combined with the greater prolificness of the other kind.

"If we propose to increase the power of resistance to the leaf disease by culture it will be necessary first to study the properties and differences of the various coffee varieties. Such differences occur to a marked degree," as the lecturer was able to show by pictures of the leaves of Java and Robusta coffee. "The cultivation must be conducted by setting out special nurseries of the various mother kinds—the mother kinds that have the best foliage and yield most berries are, in consequence, the most profitable." By further photographic pictures, shown in stereopticon views, the lecturer was able to present the differences to the meeting: the different outward appearance of a specially cultivated plantation, and on the other hand of a plantation raised from uncultivated seed was plainly shown to the audience.

"Nature herself has already conducted a bastard cultivation, there being a number of bastard growths between Java and Liberia coffee. Some of these, the Kalimas coffee, for instance, are very well adapted for cultivation. Unfortunately their propagation by seeding is too uncertain; it is necessary, especially at the commencement, to propagate the plant by grafting, which is, of course, attended with difficulty. On the other hand, the Kalimas is entirely free from leaf disease and has maintained this property for a long time, so it is to be supposed that this will always be the case. Other hybrid or bastard growths also merit attention, as they recommend themselves by a special properties."

The speaker concluded his lecture with the intimation that the methods herein discussed were not experiments undertaken from a purely scientific standpoint, but had already found adoption in practice, and that everywhere in the Javanese coffee enterprises efforts were being made, according to the methods above described, to obtain a coffee variety immune from the leaf disease. How soon in this manner favourable results may be expected is demonstrated by the excellent crops obtained with the Robusta coffee.

The Planters' Chronicle.

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(INCORPORATED.)

The Scientific Officer.

Mr. R. D. Anstead, B.A., is now carrying out his Coorg tour, and arrangements for his visit to South Mysore about the end of next month are in progress.

An important scheme with reference to the Scientific Department of the U. P. A. S. I. has been suggested by the North Mysore Planters' Association (*vide* Proceedings, p. 533 of the present issue).

This calls for the consideration of every Planter in Southern India.

International Rubber Exhibition.

Proceedings of the Mundakayam Rubber Planters' Association (p. 537) also contain matter of general interest.

At the general meeting of that Association held on the 15th instant it was resolved with reference to the International Rubber Exhibition, 1911: "that estates belonging to this Association be asked to guarantee 4 as. per acre towards the cost of the Southern Indian section before the end of this month, and that unless 75% of South Indian rubber acreages guarantee a similar amount before the 15th proximo this Association considers that the U. P. A. Secretary should sell the space secured."

The Chairman of the above Association writes:—"Unless we can be certain of having sufficient money to make a thorough success of our section we ought not to go on with it, as a poor show would do more harm than good."

The Malabar Coast Planters' Association has already remitted Rs.1,153-11-6 for Exhibition purposes; and Hon. Secretaries of all District Planters' Associations have been requested to submit as early as possible estimates of the probable amount of contributions from their respective districts.

If a display is to be made, a very large amount of detail work will have to be done, both at this side and in England, and there will be no time to spare.

TROPHIES TO BE WON.

The *India-Rubber Journal* writes:—"The *India-Rubber Journal* 100 Guinea Silver Challenge Shield will, as already announced, be competed for at the Exhibition. The trophy goes to the best sample of Plantation Pará rubber. Mr. Pearson, of the "India-Rubber World" (New York), has modified his offer of a cup for the best method of obtaining the maximum amount of latex without injury to the tree by raising the value of the trophy to \$1,000, and doing away with the restriction which was a condition of his

previous offer, *viz.*, limiting the entries to *Castilleja* tapping systems. The prize is therefore now open to planters of any variety of tree; while this is likely to add to the number of entries, it seems to us that it will complicate matters, as a tool or system for tapping Pará is not necessarily equally applicable to, say, Ceará.

"The Rubber Growers' Association is also offering several trophies, and Sir Henry Blake, the President, is giving a handsome trophy for the exhibit proving of the greatest interest in connection with the production or use of rubber in any form."

Non-Service of Warrants.

Under date the 22nd instant the Chief Secretary to the Government of Madras, Judicial Department, writes :—

"I am directed to refer to the Resolution adopted by your Association at their last Annual General Meeting, and communicated with your letter dated the 27th August 1910, regarding the frequent failure in the Coimbatore District and in the Mysore State, to effect service of warrants issued under the Workmen's Breach of Contract Act, 1859, and the Planters' Labour Act, 1903, and requesting that the Police force in those districts should be increased.

"In reply I am to inform you that the attention of the Inspector General of Police and the District Magistrate, Coimbatore, has been drawn to the matter and that the Police force in the Coimbatore district will be largely increased under the general re-organization scheme now in progress, and any remarks the Association have to make in respect of Mysore must be addressed to the Government of that State."

Tephrosia purpurea.

("Wild Indigo." *Tam.* Kolinchi. *Hind.* Pila.)

Various inquiries as to this cover plant having been received, it may be well to give the following description :—

An erect Biennial Shrub, 3 ft. high and 2 to 3 ft. in diameter at top with numerous smooth branches setting forth new flowers and leaves as the plant advances in growth. The plant is easily decomposable as manure.

Leaves, imparipinnate 2"—3'5" long, short petioled.

Stipules, more or less smooth.

Leaflets, 9—15 opposite, 7" x 3'5", narrow, elliptic, entire, dark green above and pale beneath.

Lateral nerves, very fine and numerous and midrib prominent.

Racemes, 2'1" long, terminal and lateral: pedicels, x 1'5" long calyx, campanulate small and short toothed corolla, papilionaceous,

Purple: Stamens, diadelphous:

Pod, 9" by 1" to 1'5", four to six seeded, continuous, slightly recurved and generally tipped with persistent style.

Tap root, prominent, rather soft or easily decomposable when used as manure and about 2 ft. in length.

Seeds remain dormant in the soil without losing vitality even for a year and sprout only when favourable conditions prevail. A water-logged condition is certain death to young plants. Hence the crop should be raised on free and well drained lands or at the close of the rainy season. Saline and stiff low lying lands and the season of continuous rainfall should be avoided. Occasional dry weather showers help the crop to come up luxuriantly.

Scientific Officer's Papers.**XLV.—SECOND TOUR IN CENTRAL TRAVANCORE.**

On 26th September I reached Peermade and began a second tour in Central Travancore, my first tour having been made in April 1910, and I would ask planters to refer to the report I then wrote in the *Planters' Chronicle* and consider this a continuation of it. Both here and in Mundakayam I was most unfortunate in the weather, experiencing heavy rain the whole time, which made travelling difficult, and rendered field work at times impossible, and generally converted an easy tour into a very hard one.

Mosquito Blight and its control were discussed with various planters, and I gather that spraying and collecting, especially of the eggs, have reduced this pest to a very considerable extent; but of course the method is expensive, and this is, I fear, unavoidable. These methods of control should now be backed up by a manurial system. As a rule, the Blight attacks the low jât tea most, but it is very variable, and the exact opposite is known in the district, and in one place at least it has attacked young tea.

My attention was called to another Blight which forms reddish dead spots on the leaf, and this I take to be Brown Blight caused by a parasitic fungus which has been named *Colletotrichum Camelliae*. It is purely a leaf disease and is chiefly found on the old leaves, and it reduces the flush indirectly by damaging these. The spores are formed on the under side of the leaf, and these are carried by the wind and infect other leaves. Where the attack is bad the diseased leaves should be plucked off and burned, and this plucking should be done at the beginning of the attack, which can be recognised by the leaf at the point of attack beginning to turn yellow on the upper side. The leaves should be taken off right at the base, and the pluckers taught to hold the healthy portion during the operation so as not to get their fingers covered with spores. Plucking should be done in the direction of the wind and the diseased leaves put into bags or closed baskets, which should be stored, when out of use, away from the tea, or disinfected with Bordeaux mixture. At pruning time special attention should be paid to leaf blights and all diseased leaves taken off and added to the prunings, which should then be either burned or buried with Lime or Basic Slag.

Root disease appears to be common in the district, and it is especially spread from stumps of *Grevilleas* which have grown too big and have been cut down. Such stumps should if possible be removed with a monkey jack. It is worthy of notice that root disease in Ceylon has been found to spread from *Albizzia* stumps as well as *Grevilleas*.

Another tree which causes trouble of this nature is the 'Benteak' (*Lagerstroemia lanceolata*) a very hard wood which takes many years to rot, and which does not produce stump rot apparently until it has been dead for several years. These stumps will be difficult to remove, but as the wood contains a good deal of essential oil it may be possible to burn them out.

Arrangements were made to conduct a number of manurial experiments with Tea, and among others to try the effect of burying green dressings with Basic Slag, and the effect of Nitrolim. Some of the poorer tundas appears to me to lack humus, and on these cover crops should be grown and regularly buried. On the occasion of my last visit I was unable to find many indigenous leguminous plants which could be used for this purpose, but on this occasion conditions were more favourable, and I discovered that Central Travancore is very favoured in its leguminous flora. *Cassia mimosoides* and *Crotalaria nana* are very common, and I noticed a number of *Crotalarias*, *Tephrosias*, and *Desmodiums* which I was unfortunately unable, owing to the bad weather I experienced, to identify or collect. In connec-

tion with this I would refer planters to my first report on the district. (*P. C.*, Vol. V/1, p. 186.)

My thanks are due to the Honorary Secretary of the Central Travancore Planters' Association for making arrangements for my tour, and to the planters in the district for their generous hospitality.

RUDOLPH D. ANSTEAD, *Planting Expert*.

Notes and Comments by the Scientific Officer.

73. *Nilgiri Ladybirds*.—Last July some specimens of a Ladybird Beetle, which appeared on Coffee badly infected with Green Bug in the Nilgiris, were forwarded to this Office for identification. It was suggested that these might be specimens of imported Beetles which "were turned out in the same place some years ago."

I understand that in 1898 Newport tried to introduce Ladybirds of the following species, *Orcus australasia*, *Cryptolacmus montrouzeri*, and *Rhizobius ventralis*, but failed in his attempt and reported that "not a single living beetle was delivered in this country."

The Nilgiri Beetles were forwarded to the Imperial Entomologist at Pusa who writes, "the name of the Ladybird Beetle has been given by Mr. Andrews as *Sticholotis andrewesi*, Weise. It was described in *Stettin Entomologische Zeitung* for March 1908 from examples sent from the Nilgiris, and is not known from elsewhere."

Hence it appears that this Ladybird is an indigenous species, and not an imported one. It is a small black Ladybird with four yellow spots on each wing case, and it should be encouraged and protected as much as possible wherever it is seen, as it is a beneficial insect and probably feeds on scale insects.

74. *Hidebound Trees*.—I have on several occasions had complaints about Rubber Trees being 'hide-bound,' and enquiries made as to whether it would not be a good plan to cut a gash in the bark. Such drastic treatment would probably not have the desired effect, and in all such cases which I have seen the condition has been produced by neglect, and by allowing grass and weeds to smother up the root area of the trees, and an application of manure would do more good than anything else. Apparently Mr. Petch has been receiving enquiries of a very similar nature in Ceylon, and in his 'Miscellanea,' published in the *Tropical Agriculturist* of September 1910, he writes as follows:—

"It has been suggested by a correspondent whose *Hevea* trees, grown at a fairly high elevation, appeared somewhat 'hide-bound' that they would be improved by rubbing off the outer layer of dead bark. It is not probable that such a treatment would have any effect, since the layer in question is thin, and usually cracked, and does not exert any pressure on the tissues beneath. An application of manure would seem to be indicated. There appears to be an idea current that rubbing off the outer bark will 'irritate' a tree, and cause it to increase its girth more rapidly. But, apart from the fact that 'irritation' of this description is unknown in plants (except, perhaps, in certain tendrils), it will readily be seen that such a process could not affect the cambium which is responsible for the growth in thickness. The only result of rubbing off the layer of dead bark would be that the tree would produce another layer at the expense of the laticiferous tissue, as is evident when a tree is scraped."

RUDOLPH D. ANSTEAD, *Planting Expert*.

DISTRICT PLANTERS' ASSOCIATIONS.**North Mysore Planters' Association.**

*Proceedings of Quarterly General Meeting held at Balehonnur
on October 6th, 1910.*

PRESENT.—Messrs. C. P. Reed (President), C. H. Browne, C. Danvers, E. C. Bolton, F. W. Hight, E. W. Fowke and A. F. Evetts (Honorary Secretary). By Proxy.—Messrs. S. L. Mathias and D. Mathias. Visitors: Messrs. L. King Church, H. Browne and B. D. Darkin.

U. P. A. S. I. Delegate's Report.—Mr. C. Danvers read his report—Mr. C. H. Browne proposed a vote of thanks for so ably representing us at the meeting in Bangalore, which was carried unanimously.

Scientific Officer.—Mr. C. H. Browne addressed the meeting as follows:—

“Gentlemen,—We are all very grateful to Mr. Danvers for having brought to the notice of the meeting in Bangalore, several of numerous subjects, which in Mysore require the special attention of the Scientific Officer. What I should like to know is whether you consider these and the various other subjects requiring his urgent attention, are likely, in the near future, to receive that attention which we desire and they deserve. I do not myself think it is in the least probable. I have the greatest respect for Mr. Anstead; his energy, zeal, scientific attainments and last but not least, his practical common sense fill me with admiration, but one Scientific Officer, however energetic, cannot do work which would give full employment to half a dozen.

Our Coffee suffers from every disease and pest to which coffee is heir, excepting perhaps ‘green bug.’ From leaf disease, root rot, black rot and what not, we lose annually lakhs of rupees; our bean is said to be deteriorating, as also the stamina of our trees, while annually we squander thousands of rupees in buying manure, because it is manure, not because it is the manure most suited to our particular requirements and giving us the maximum value at a minimum cost.

I think we are all pretty well agreed that we are in urgent need of scientific aid; what are we doing in the way of securing it?

Our Association pays something less than one anna an acre on its total acreage to the Scientific Officer Fund, and excellent value the members are getting for their money, if they will only take the trouble to read their *Planters' Chronicle*, but we are not satisfied, we want more; what we want is to pay one anna an acre and reap benefit to the extent of Rs.50 an acre, which is unreasonable.

If we want to derive any appreciable benefit from science, we must be prepared to pay for it; either we want scientific aid or we do not want it; if we do want it, let us stop trifling and set about getting it in a practical way, firstly securing the services of a scientific officer who shall work under Mr. Anstead and devote himself entirely to Mysore and who would know every estate and its peculiarities of soil and climate, and who would be competent to advise us on the hundred and one points on which we need advice; and this could be done by taxing ourselves to the trifling extent of, say, 8 annas per acre. I am prepared to hear some members say they could not afford such a sum, that Agents or Proprietors would not sanction such an expenditure. My answer to that is, the average gross expenditure on a cultivated estate in Mysore is from Rs.50 to Rs.100 an acre; putting it at the moderate

sum of 1,000 annas per acre, can any Proprietor or Manager honestly say that out of that amount he cannot afford to set apart, say, 10 annas an acre towards his Association and to fighting disease and pests? As for Agents, these gentlemen are, as a rule, practical men of business presumably endowed with the average amount of common sense; if the case is properly put to them, I refuse to believe they are such blockheads as to object to a manager setting apart 10 annas out of the Rs.70 per acre they allow him to work the estate, in trying to find a remedy for the loss of crop and damage done to the estate by disease and pests and to ensure that the money they allow him to spend on manure is spent in the right direction and not half wasted.

I should like to see every district in South India paying 8 annas an acre on its acreage to the U.P.A.S.I.; if this were done they could dispense with the constant call on members for subscriptions to Benevolent Fund, Rubber Exhibition and all other vexatious funds; our parent Association would assume its proper position and fitly represent the great planting industries of South India, it could have a scientific department with a properly equipped laboratory and a staff of scientists with Mr. Anstead at the head ready to go anywhere and fight any disease; last but not least, it would have a large balance at its Bankers and be a Power in the land.

If you agree with me in thinking we are in urgent need of further scientific aid, I would suggest that we approach the other District Associations and see how far they are prepared to fall into line with us, but whether they do or whether they do not, we should at once take steps to secure it for ourselves."

After an animated discussion it was decided that at least one scientific officer was needed to devote himself entirely to the needs of the Mysore planting industry, and the following resolutions were carried unanimously.

Proposed by Mr. Browne and seconded by Mr. Hight:—"That this Association considers that no single man is able to cope with the vast amount of urgent work to be accomplished in the Planting Districts of Southern India, and that the Honorary Secretary do communicate with the other District Associations through the U.P.A.S.I. and ascertain their views, whether they are prepared to increase their contributions to the Scientific Officer Fund on an acreage basis of say 4 annas an acre, or even more, so that Mr. Anstead could be provided with special assistants to deal with Coffee, Tea and Rubber."

Proposed by Mr. Danvers and seconded by Mr. Bolton:—"That Mr. Browne's remarks be embodied in a circular letter to the members of this Association and that copies be sent to the Honorary Secretary, S.M.P.A., for distribution."

Scientific Officer's Laboratory.—It was decided that the sum required for the Laboratory be taken out of current account instead of from the deposit account as agreed to at the last meeting.

Proposed Coffee Cess.—Read letter from the Secretary, U.P.A. dated September 28th, 1910.

King Edward Memorial.—It was decided to leave this matter to individuals and to take no steps as an Association.

Experimental Plots.—The following committee was elected to go into the matter and make arrangements: Messrs. Danvers, Reed, Bonner, and Fowke.

Planters' Benevolent Fund.—The total of our subscription list amounts now to Rs.1,520. Since our last meeting the following donations have:

been received—from Messrs. Morgan & Son, A. J. Saldanha & Sons, R. G. Oliver, Rs.200 each and Major F. Clifford Rs.100, as well as the following annual subscriptions of Rs.10 each, *viz* : from Messrs. Lund, Trevor-Roper, Robinson, Fremlin, T. Hunt, and Lincoln. The new Book of Rules has been circulated, and it is hoped members who have not yet subscribed will do so.

Resolved :—" That the Honorary Secretary do write and thank Messrs. Morgan. & Son, A. J. Saldanha & Sons, R. G. Oliver and Major F. Clifford for their generous donations."

Liquid Fuel.—Read letter from Messrs. Best & Co.

Buntwal Petition. Read this Association's letter to the Collector of S. Canara on this subject. Resolved :—" That the Honorary Secretary do write to the District Superintendent of Police, S. Canara, kindly requesting that precautions be taken to prevent thefts of coffee in transit, particularly when passing through Buntwal to Mangalore.

Kalasa Medical Fund.—Read letter dated 23/6/10 from the Senior surgeon with the Government of Mysore in reply to this Association's request.

Proposed Pest Act.—Resolved :—" That this Association is in favour of the introduction of a Pest Act suitable to the conditions of Southern India and that the Honorary Secretary do write to the Secretary, U. P. A., to try and obtain a copy of the Pest Act as in force in the West Indies.

Subscription to U. P. A.—As all the members have now furnished the Honorary Secretary with their acreage figures, it was resolved :—" That the Honorary Secretary do pay the balance annual assessment as shown by the complete acreage list."

Dasara Delegate.—Mr. E. W. Fowke was elected to represent this Association.

A vote of thanks to the President and Honorary Secretary concluded the meeting.

(Sd.) A. F. EVETTS,
Honorary Secretary.

Mundakayam Rubber Planters' Association.

Minutes of the fourth Quarterly General Meeting held at Kadaman-kolam Bungalow at 11 a.m. on the 15th October, 1910.

PRESENT :—Messrs. R. Harley, R. E. Haslam, A. Hamond, F. H. Hall, E. Wilson, (by proxy), Malcolm Smith, J. Wedderspoon, J. R. Vincent (Honorary Secretary), and J. J. Murphy (Chairman).

The minutes of the previous meeting were taken as read, and the minutes of the last Committee Meeting were read and confirmed.

The Chairman, as delegate to the U.P.A. meeting, reported as follows :—

Many of the subjects brought before the meeting, such as Hybridization of Coffee, need not be referred to by me, as apart from the very real sympathy we feel with our brother planters of the coffee districts in their plucky struggle to keep up their end they do not in any way concern us. The labour question is always of interest to everyone, and a good deal of time was devoted to discussing it. The resolution passed asking for legislation to protect emigrants was spoken of by the Chairman as a step in the right direction. It is a step, Gentlemen, which in my opinion will not take us very far. Certainly we cannot expect the Madras Government to accede to our wishes unless we clearly prove that the legislation asked for is really required

for the protection of emigrants and not merely to help the short-of-labour planter. A Committee was appointed to acquire information as to fresh sources of labour supply, but I doubt if even the delegate who brought forward the resolution on the subject has more than a very faint glimmer of hope that any good will result. I found myself in thorough agreement with the Wynaad delegate, Mr. Mead, when he said that sufficient recognition is not given to the great increase of late years in cost of living to the cooly. Down here we raised the rate of pay not very long ago and have all got sufficient labour this year, while other districts paying lower rates complain that their coolies are emigrating to Ceylon and the Straits. The question of Non-Service of Warrants was, I think, suitably dealt with, and "Standardization of Weights" was not neglected. Of great importance to us was Mr. Tipping's resolution asking for preventive legislation in regard to the theft of estate produce. I have been told that the remarks I made with reference to the cultivation of rubber by Indians are liable to be misunderstood. I am sorry for this, as I had no intention of complaining because Indians have taken to rubber growing. On the contrary, I admire, as I think we all do, their enterprise. The point I wished to make is that their rubber will almost certainly be sold in one of the West Coast towns and that then, with a market at their doors, dishonest coolies and other dishonest people will, unless there is preventive legislation, find it more profitable to steal our produce than to follow their legitimate occupations. Nothing I heard at the meeting in any way removed what a Madras paper called my strange misgivings as to the benefits to be derived from our taking part in next year's Rubber Exhibition. The other rubber delegates present, however, did not agree with my views, and as the money required, if collected on an acreage basis, is only about 4 as. per acre, an insignificant sum when compared with the improved prices at which the expenditure of it will, I am told, enable us to sell both our rubber and our shares, and as it was said that space for our exhibits would not be obtainable unless booked immediately, I joined with other delegates in indemnifying the U. P. A. against loss to the extent of £180. The guarantee I gave was a personal one and in no way committed this Association.

Although I spoke in opposition to the Nilgiri Delegate's Preferential Tariff resolution I refrained from voting against it, as I had no instructions from you. I do not suppose that either of the great political parties at Home cares in the very least how we vote on the subject, as our votes do not count in Home elections.

I have no doubt but that you have all carefully read the Scientific Officer's addresses, so there is no need for me to refer to them further than to say that the part taken in the meeting by Mr. Anstead was a leading and most interesting feature of it.

Many complaints were made as to the smallness of our annual subscription to the Scientific Officer Fund. You had given me no authority to increase the amount, but I said that if subscriptions were raised on an acreage basis our Association would be certain to fall into line. In regard to the equipment and upkeep of the laboratory, it was estimated that 6 pies per acre would be required for the first year and 2 pies per acre in subsequent years. This I promised on your behalf.

Some few alterations were made in the rules of the Benevolent Fund, and the Revised Rules are now ready for circulation. The amount subscribed to the end of July was only about Rs.5,000, composed to a great extent of donations and not of annual subscriptions, so this most excellent movement cannot be said to have made a very brilliant start. It is a matter for regret that in the list of subscribers the names of companies owning land in this

district are not to be found, and that Home agents have not followed the good example set by West Coast firms.

My remarks concerning a Pests Act have not been very accurately reported in the Book of Proceedings. A Pests Act would not in my opinion do us in Travancore much if any good, considering the way our estates are surrounded by Government and Edavagay waste lands.

I do not think, Gentlemen, that there are any other subjects calling for comment, but I shall be glad to answer to the best of my ability any questions you may put.

Mr. Vincent proposed a vote of thanks to the delegate and moved the adoption of his report. This was seconded by Mr. Harley and carried unanimously.

Foreign Liquor License.—Proposed by Mr. Harley and seconded by Mr. Vincent: "That Government be requested to grant a second Liquor License in Mundakayam."—Carried unanimously.

1911 Rubber Exhibition.—Read telegram from Malabar Coast P. A. saying Rs.1,000 had been subscribed for the Exhibition Fund and that most of the estates were joining the scheme. The South Travancore P. A. wired that Managers favour an acreage cess but sanction of estate owners has to be obtained.

It was proposed from the Chair: "That estates belonging to this Association be asked to guarantee 4 as. per acre towards the cost of the Southern Indian section before the end of this month, and that unless 75% of South Indian rubber acreages guarantee a similar amount before the 15th proximo this Association considers that the U. P. A. Secretary should sell the space secured."—Carried unanimously.

Rubber Theft Act.—It was proposed by Mr. Vincent and seconded by Mr. Murphy: "That a Committee be formed of Messrs. Harley, Murphy, Vincent, and Wilson to consider the Rubber Theft Act drawn up by Mr. Richardson."—Carried.

Breach of Contract Act.—Proposed from the Chair: "That our legislative member, Mr. Richardson, be asked to press for 'Extradition' and in the event of its being refused to ask for concurrent jurisdiction of Law Courts in B. India and Travancore"—Carried unanimously.

Proposed by Mr. Haslam and seconded by Mr. Hamond: "That Government be asked to fix the stamp value on all contracts of Rs.50 and under at not more than one anna."—Carried unanimously.

It was resolved that further consideration of the Breach of Contract Act be left to the Committee.

Book of Proceedings.—Resolved, that a copy of the Book of Proceedings be furnished to each Estate subscribing to the Association.

Roads.—Read letter 6269. Resolved, that the Association thank the D. P. W. for sanctioning a bridge at the 3rd mile of Lalam Road.

The Honorary Secretary was asked to send a reminder to Government about his letter dated 28-4-1910 with reference to the Manikal-Kuppakayam road and also to write asking that the verbal contract for the upkeep of the Kuttikal road be confirmed, as money has already been spent.

Munsiff's Court.—Resolved, that the Dewan be asked to receive a deputation with reference to the removal of the Court from Kanjirapally to Lalam; that Messrs. Vincent, Hall, and Murphy represent the Mundakayam

Association on the deputation, and that the Central Travancore P. A. be asked to appoint representatives.

Doctor Scheme.—Messrs. Atkins, Davy and Harley were elected as the Mundakayam Committee for the Scheme. The rules having been read, alterations were recommended for the consideration of the Committee.

Laboratory for the Scientific Officer.—The Hon. Secretary was requested to send out notices for the 6 pie per acre cess to be paid immediately.

A vote of thanks was proposed to Mr. Harley for lending his Bungalow at such short notice.

With a vote of thanks to the Chair the meeting terminated.

(Signed) J. J. MURPHY,

Chairman.

„ J. R. VINCENT,

Honorary Secretary.

Wynaad Planters' Association.

*Proceedings of a Special Meeting held at Meppadi Club on
October 12th, 1910.*

PRESENT :—Messrs Ewart, Halleley, Malcolm, W. R. McKenzie, Mead, Powell, Trollope, West, Winterbotham, and C. E. Abbott, Honorary Secretary. Mr. West in the Chair.

1616. *System of Voting and Subscription.*—Mr. Mead proposed that from January 1st, 1911, the following shall be the *method of subscribing* to the Wynaad Planters' Association. To meet the subscriptions to the U. P. A. S. I. and the Scientific Officer Fund an acreage assessment shall be levied. To meet local expenditure a personal subscription of Rs.12 be raised. That the following are eligible to subscribe and vote: Proprietors or superintendents representing proprietors provided the estates they represent also subscribe on their acreage, Coast agents and visiting agents provided the estates they represent subscribe on their acreage. *Voting.*—Each personal subscription of Rs.12 to carry one vote;—each Rs.12 of acreage subscription to carry one vote. Mr. Malcolm proposed the following addition to the above: "Provided that the total votes of any one person, company or syndicate inclusive of the votes of their employees do not exceed at any time more than half the total votes of the Association." This was accepted by Mr. Mead. The resolution was seconded by Mr. Winterbotham and carried.

Proceedings of an Ordinary General Meeting held on same date.

The same members were present. Mr. West in the Chair.

1617. *The Proceedings of last Meeting* were confirmed.

1618. *Roads.*—Read letter from Honorary Secretary to District Board Engineer regarding the complaints made at September Meeting about Road 35 B and the Vellera Mulla Road, to which no reply had been received.

(A reply has been received since the meeting).

Road 38.—Mr. Mead complained of the state of this road between mile 21 and the Sholadi Bridge, which appears to have had no work done on it. The representative of the Association on the District Board was requested to draw the attention of the President to this complaint. The Honorary

Secretary was instructed to ask that notice may be given when any section of road in Malabar is blocked against traffic for repairs.

1619. *Non-Service of Warrants*.—Read letter from Honorary Secretary to District Superintendent of Police, South Malabar, with reference to Mr. West's complaint (para 1609). No answer has been received ; but Mr. West informed the Meeting that Narayan has returned to Toura Mulla Estate.

1620. *Recruiting for Ceylon*.—Read letter from Honorary Secretary to Secretary, U.P.A.S.I., with reference to Mr. Rowsell's advertisement ; Mr. Ormerod has written to the Ceylon Planters' Association on the subject.

1621. *Allahabad Exhibition*.—Read letter from Mr. Drew. The Meeting considers that it is too late to take any steps to be represented at this Exhibition and regrets that the subject was not before the U.P.A.S.I. Meeting.

1622. *The Fugitive Offenders Act*.—Read letter from Mr. West enclosing letter from the Collector of Malabar in which it is stated that this Act is only applicable to offences punishable with 1 year's rigorous imprisonment.

Read also Proceedings of this Association of June 10th, 1908 (See *Planters' Chronicle* Vol. 3 p. 138) from which it would appear that planters in Ceylon can obtain the arrest of defaulting maistries and coolies in India under this Act.

The Honorary Secretary was instructed to address the Collector on the subject.

1623. *Rubber Thefts*.—Read U. P. A. S. I. circular 42 and enclosure. Recorded.

1624. *Timber on Darkhast land*.—Read letter from Honorary Secretary to Rao Bahadur C. Gopalan Nair and reply. Recorded.

1625. *Planters' Chronicle*.—U.P.A.S.I. circular 42. Copies of bound volumes 4 and 5 can be obtained from Secretary, U.P.A.S.I. Members who wish to have their copies bound can obtain the index to Vol. 5 at the cost of 4 annas.

The cost of the bound volumes from Bangalore is little more than it costs to have loose copies bound, and if copies are ordered in advance the price will be further reduced.

1626. *Planters' Benevolent Fund*.—Subscriptions already paid will count up to June 30th, 1911. Future subscriptions will count from the date they are paid.

1627. *Labour Committee's Report*.—Copies were distributed to Members present ; others will be sent with these Proceedings.

1628. *Papers on table*.—Messrs Peirce, Leslie & Co.'s circular about manures. The analysis of these is guaranteed by the Firm.

Balloting papers for election of the Member of Council were destroyed. Letter from Tahsildar about sale of Mangalad Estate.

I. T. A. circulars.

Vote of thanks to Chair.

(Signed) A. WEST,
Chairman.

„ C. E. ABBOTT.
Hon. Secretary.

CORRESPONDENCE.

Clean Weeding.

BALUR ESTATE,
KADUR, 18th OCTOBER, 1910.

Dear Sir,—On the subject of Clean Weeding for Rubber Estates, I send you a cutting from "The Financier," which may interest many of your readers. If you are unable to print the same in *The Chronicle* I shall feel obliged if you will kindly return it.

Yours truly,
ERNEST LUND.

RUBBER NOTES.

MR. A. B. LAKE'S VIEWS ON THE SUBJECT OF CLEAN WEEDING ON RUBBER PLANTATIONS—CHINESE LABOUR FOR MALAYA.

A most interesting and informative expression of opinion by no less an authority than Mr. A. B. Lake, of the Highlands and Lowlands Company, reaches us, through the medium of "Grenier's Rubber News," on the much-discussed question of clean weeding or the reverse on the Middle East rubber plantations. On April 22nd last we published an article on clean weeding, basing the same upon the views of certain practical men who were good enough to place their knowledge and experience at the disposal of our representative. Mr. Lake thinks that most people will come to the same conclusion as one "practical planter"—namely, that "weeds on an estate, though in theory right, are in practice hopelessly wrong."

One of the principal objections we have heard urged against absolutely clean weeding is the expense to which such an operation would put the owner or the proprietary company, and this was especially so in the days when our knowledge of what was likely to prove permanently successful in plantation rubber practice was very much smaller than it is now. From this view Mr. Lake dissents, and that with some vigour. It is stated that the one great drawback to clean weeding is its expense. I entirely disagree with this, but, of course, if an estate once gets out of hands and weeds are allowed to seed, clean weeding will be expensive, at any rate for a time."

But, Mr. Lake maintains, clean weeding on a regular three-weekly system from the very first—that is to say, a few days after the "burn"—is not expensive, and is in practice the cheapest method. He gives what everyone must admit is a striking instance from his own experience in this connection. "The average cost," he says, "of weeding per acre per mensem for the last financial year (April 1st, 1909, to March 31st, 1910) on an estate in which to the latter date I was interested was 54'03c. Now this estate of over 1,000 acres is still quite young, the oldest rubber (120 acres) in March, 1910, being only 3½ years old, so there was little shade to keep down weeds. There were, I estimate, between 80 and 100 acres of ravines, which were all planted and clean-weeded, and the place was unhealthy—so much so that, bar nurseries, weeding, actual planting and pruning, practically every work had to be done by contract. The conditions therefore, were in no way favourable, yet the cost of weeding, because it had always been done systematically and well, was a bagatelle; and I could name other estates where I feel certain the cost of weeding per acre per mensem is well under one dollar, not all healthy estates, either."

We may take it, then, that what we have read or heard—mostly heard, by the way—of the heavy outlays upon certain Malayan rubber plantations in order to ultimately clean-weed these properties was the outcome of two things. Either the management did not believe in clean weeding, or, if it did, the necessary labour was not available to carry out this operation on the lines followed by Mr. Lake—that is to say, from the first

possible moment. Mr. Lake's communication to our Kuala Lumpur contemporary does not, however, end with his experience as a clean weeder. In our article of April 22nd last the suggestion was thrown out that the alternative to clean weeding was weeds. This does not quite satisfy our friendly critic. He prefers two alternatives, and puts them thus : (1) Grass or weeds; (2) Cover plants, such as mimosa, crotolaria, passiflora, foetida. The mere fact that the writer's subsequent remarks upon these alternatives are to all intents and purposes destructive criticism of the suggestions leaves no doubt whatever, if any could possibly exist, in the minds of readers that Mr. Lake is an out-and-out clean-weed advocate—under present labour conditions in Malaya.

Grass, he points out, may be possible in rubber five years old or more if fairly closely planted and when regularly cut, but Mr. Lake is certain "it is not to the benefit of the rubber." In this view he is supported by Mr. Gallagher, who was lately the Director of Agriculture for the Federated Malay States. Mr. Gallagher thought that grass did more harm to old rubber than to young, since in dry weather it robs the multitude of tiny surface rubber roots of the benefits of the dews or an occasional light rain.

There is, however, a more deadly danger than the absence of surface moisture to rubber trees through the presence of grass. Even when fairly carefully cut it is apt to harbour lalang—and lalang, once given a good grip of a rubber plantation, is the very deuce and all. "I have seen lalang," Mr. Lake remarks, "which had ousted the grass, in rubber eight years old and planted 18 ft. by 18 ft., gradually entirely stop the yield of latex, as the trees became hide-bound and lost most of their foliage. I have also seen how this clearing, when the lalang was dug out, recovered its yield and health." The danger to young clearings from lalang is so obvious that it need not be enlarged upon at the present juncture. Then the light easily reaches the weed, and unless immediate steps are taken the eventual weeding bill will be one to cause estate proprietors anything but joy.

Even with the utmost care in searching (when that can be done, which is not always the case) for lalang through grass, trouble appears almost inevitable. "I can remember," says Mr. Lake, "a clearing where bullock grass was deliberately left with instructions to cut out any lalang that showed itself. This was good theoretical advice, but not practical—as the bullock grass become so high that not only would coolies shirk going into it, but men, if they did, could not see one quarter of the lalang, and for every blade of lalang that showed, hundreds of roots were surreptitiously spreading their way underground, till one day a field of lalang flourished in place of grass. I have seen," adds the writer, "experiments with other grasses, but never a success, and where you have grass you can never clean weed cheaply in the vicinity. The birds see to that."

Turning now to cover plants such as those enumerated above, we do not find Mr. Lake figuring as anything resembling an enthusiastic supporter of their use. Cover plants, as a matter of fact, are not now in favour in Selangor, and this reversal of opinion as to their utility has been fairly rapid, since only a year ago a very large area was under them. Some varieties, Mr. Lake points out, did not exercise the primary reason for their existence by keeping weeds down, and they harboured vermin, rats and snakes. Where there was timber they encouraged the spread of root fungus, and in some cases acted as carriers of it. They also interfered with the proper supervision of work, and proved in the long run a curse rather than a boon. In certain cases, Mr. Lake thinks, "an exception may be made in favour of passiflora in old campong (*i.e.*, garden) land. Take, for instance, land which is full of weed-seed and has no timber on it. This creeper will probably reduce the

cost of weeding on such land, but even here a careful watch must be kept for lalang."

While a thorough-going believer in clean weeding on plantation rubber estates in Malaya, Mr. Lake does not regard the system as perfection as it stands to-day. He thinks it would prove an all-round benefit to estates if digging over, say, four times a year could be adopted, and in this an ideal treatment might be found. "But," he says, "as long as our labourers, mostly recruited from India, can leave us at a month's notice (or abscond with impunity without any), it is too dangerous a stem to try." In the result, the great majority of managers prefer clean weeding, which has, at any rate, the advantage that for each year the expenditure can be pretty accurately estimated. "Grass, on the other hand," says Mr. Lake in conclusion, "may, and probably will, end in lalang—and a bill of anything from 25 dollars to 60 dollars per acre, as well as a legacy of land that is a seed-bed for weeds." Here, then, given as fully as our available space permits, are the opinions of a recognised planting authority on clean weeding, and if any other planter of standing has views on the subject he would care to express we shall be pleased to grant them equal publicity.

By a rather happy coincidence in the issue of "Grenier's Rubber News" containing Mr. Lake's letter dealing with our clean-weeding article appears an interview with Mr. W. Jackson. Mr. Jackson is the manager of the Planters' Labour Bureau (F. M. S.), Ipoh, and he has been on what looks like a very successful labour-recruiting tour in China. The Chinaman has been found, under most circumstances, a useful and usually conscientious worker on rubber plantations, but there has hitherto been a certain amount of difficulty with regard to his wages and food allowance on many of the estates employing him. These difficulties are likely to be obviated if the form of contract adopted by the Planters' Labour Bureau can be effectively worked.

COMMENT BY THE SCIENTIFIC OFFICER.

[In the extract sent by our correspondent the old arguments in favour of clean weeding are once more put forward, only the most forcible ones have been omitted. The opposing view in favour of not weeds, but cultivated cover crops, has been fully advocated in the *Planters' Chronicle*, so that I need do little more than call attention here to one or two points.

As regards expense, it is obvious that a system of cover crops must be cheaper, but expense is not the main point. With cover crops labour is set free to do other work, a most important point in Southern India, and in addition wash is prevented, and I claim that the Rubber is brought on more quickly.

If, as Mr. Lake says, the labourers can leave at a month's notice, or abscond without impunity without any, weeding will break down, and a cover crop left to rip will not do as much harm as weeds neglected.

I quite agree that grass is unquestionably bad for additional reasons to those stated, but I cannot agree that "weeds on an estate though in theory right, are in practice hopelessly wrong," that is if by 'weeds' are meant cover crops. Cover crops are a practical success in many countries, and Mr. Mead's experiments in the Wynaad (See *P. C.* Vol. V/2, p. 487) have already gone far to show that they are a practical success in this country.

Palapilly Rubber has also proved their success, and I think the Manager would smile if you told him he was "hopelessly wrong in practice."

I suppose, however, this argument between the two schools of thought and practice will go on in Southern India until we are able to show by more figures, and results, the advantages of the cover crop system beyond dispute, and I am glad to say that a number of experiments are now being carried out in every district, which I am quite confident will establish the merits of the system on a firm basis.—R. D. A.]

SELECTED CUTTINGS.

The Fertility of the Soil.

No horticultural problem has given rise to more discussion than that of the causes of the fertility of soils ; and the varying pronouncements of science find an echo in the varied practice of cultivators. At one phase of the investigation, scientific men have proclaimed that, since plants absorb mineral salts of potassium, phosphorus, nitrogen, &c., from the soil, fertility depends on the quantities of these several plant-foods contained in the earth. At another phase, after the chemist had demonstrated that ordinary soil contains from 50 to 100 times more of these substances than a field crop extracts from it, the scientific agriculturist declares that the amount of mineral constituents is of less importance to soil-fertility than is the relation between the soil and the water it contains. In support of this view, he invokes not only chemical analyses of soils, but also the facts that, in practice, the cultivator devotes a large proportion of his energies to increasing, or modifying in a manner favourable to plant-growth, the amount of water in the soil. As knowledge of the physiology of plants increased, it became clear that, though the soil is a great storehouse of plant-food, and contains almost unlimited reserves of the mineral substances essential to plants, yet, unless the mineral substances are present in an available form, that is, in a form in which they may be dissolved readily, the soil is unfertile.

During the dispute between the upholders of the chemical and the advocates of the physical theories of soil-fertility, a third party intervenes. Waving aside the disputants, he proclaims that the secret of fertility is to be found neither in the physical nor in the chemical condition of the soil, but in its biological state. He points out that the earth is a living earth ; that it teems with bacteria—a clod of soil containing many millions of these living and very active organisms. For a time, the astonishing discoveries of the bacteriologist hold the attention of the audience interested in the physico-chemical discussion. In quick succession, he announces the discovery of nitrogen-fixing soil bacteria, supplying the proof that the earth renews its stores of combined nitrogen through the activity of certain of its bacteria, which take the free nitrogen gas of the air, combine it with other elements, and so render it available to the roots of plants. Next he shows that other races of bacteria change the ammonia, formed during the decay of plant and animal remains, into nitrates, and thus serve also the requirements of plants. Further, he reveals the presence of yet other soil bacteria, which work in a spirit of flat contradiction to that of the nitrifying organisms, and, by decomposing nitrates, give rise to ammonia, which, unless combined with mineral bases, escapes into the air, and so is lost to the soil. In the gigantic stride which he has made during the last 50 years, the bacteriologist solved the old riddle of the fertilising effect of leguminous crops. But in science the last word is never said, and now the zoologist takes a turn in bringing his science to bear on the problem of soil-fertility. As Mr. Hall has pointed out in these pages, and as he indicated in his admirable address before the agricultural sub-section of the British Association at Sheffield, bacteria are not the only micro-organisms which play an important part in determining soil-fertility. In that underworld of life—the foot or so of surface soil—exist large numbers of protozoa,—amaeba-like, unicellular animals. They feed upon the bacteria, and therefore count in determining the composition of the micro-flora of the soil. To the voracity of the protozoa is due the limitation in numbers of the soil bacteria, and it is by reference to them that the remarkable effects of sterilisation on soil fertility are to be

explained. As our readers know, soil heated to the temperature of boiling water yields larger crops than ordinary soil. The explanation of this enhanced fertility, which we owe to Drs. Russell and Hutchinson, of Rothamstead, is strikingly simple. The heat to which the soil is exposed suffices to kill the protozoa and some bacteria. The bacteria which are left are largely of the ammonia-producing type. Freed from rivals and secure against devouring protozoa, they increase with enormous rapidity, till, within a few days, every grain of soil contains about half a million of these organisms. As a consequence of the exuberant activity of the ammonia-producing bacteria, large quantities of ammonia accumulate in the soil, and the plant, obtaining plentiful supplies of nitrogen, grows apace. Thus, stage by stage, the problem of soil-fertility is being solved, though not yet may the complete solution be held to have been obtained. As the soil is a complex physico-chemico-biological structure, so is its fertility the result of complex and interacting conditions. Nevertheless, horticulturists have reason to be grateful to scientific men for their labours, though, with the wide experience which comes of constant work on the soil, they may not be ready always to hail each new discovery as a solution of all their difficulties.—*Gardeners' Chronicle*.

The Rest Period in Plants.

Mr. Walter E. Colling, M. Sc., F.L.S., F.E.S., writes in *Knowledge*:—

The winter rest period of plants is a subject of considerable economic importance, and the results of numerous experiments have shown that by different modes of treatment they may be aroused from this resting state or may be caused to omit their ordinary habit of resting and grow continuously.

The latest contribution to the subject is a most interesting memoir by Professor W. L. Howard, of the University of Missouri Agricultural Experiment Station (Research Bull; No. 1, 1910), in which he sets forth the results of a most elaborate investigation upon this subject.

As a result of extensive studies and experimentation he concludes that nearly all fruit trees and ornamental shrubs have definite resting periods, *i.e.*, each species; and possibly each variety, has a certain number of days during which it will not grow under natural conditions. But the great majority of species do not have this winter period of rest so firmly fixed that they cannot be awakened from it. Unfavourable external conditions determine both the time of occurrence and the degree of intensity of the period; if these unfavourable conditions occur at intervals, a plant readily adapts itself to the new demands, and the rest becomes a habit which may continue to be repeated automatically for a longer or shorter period of time.

The practical application.—A practical application of the above principles is cited in connection with the peach. This tree is known to have a comparatively short resting period (about six weeks), and is frequently liable to injury in late winter by frost owing to the habit of premature growth during warm days in late winter. If the trees could be caused to continue growing later in the autumn, they would continue dormant a correspondingly longer period in late winter.

Professor Howard concludes: "If it were known definitely that plants have a tendency to grow at unreasonable times by reason of the fact that they have very slight resting periods, or that the resting stage is at an end, we might then set about devising means for regulating the period of dormancy or, knowing that their habits of growth in this respect cannot be easily changed, of finding means for protecting them."

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(INCORPORATED.)

The Scientific Officer.

After visiting North and South Coorg Mr. Anstead returns to headquarters to-morrow. He was, unfortunately, unable to study coffee-curing operations, no coffee having come forward yet; but an opportunity will be made later for him to visit the works at Hunsur.

A report of a lecture he delivered at Pollibetta on the 26th ultimo will be found on page 549.

International Rubber Exhibition, 1911.

The Malabar Coast Planters' Association expects to contribute Rs.2,283 to the Exhibition Fund, and has already remitted Rs.1,580-2-11 out of this.

HINTS FOR EXHIBITORS.

Under date the 12th October, 1910, the Manager of the Exhibition writes:—

"I am in receipt of yours of the 21st September.

"I have had an interview with Messrs. Rowe, White & Co., they have signed a contract for space and paid deposit.

"Re necessary papers. I think I explained in my previous letter we do not issue any papers for filling in, they are not necessary and from past experience I have often found they are misunderstood, that is why none have been printed for this exhibition. All that will be required is for the exhibitor to fill in his name and address and then let him follow on with the description of his exhibit, whatever it may be, on one sheet of paper; of course the most important item will be that it is very legibly written, correct spelling being very necessary. Therefore, I think if you just send a notice to this effect to each exhibitor it will cover the ground. It will greatly assist us if the descriptive matter is only written on one side of the paper and if possible each exhibitor's description kept separate.

"I shall also be pleased to have a full list of the Committee as soon as complete, so that I may have it set up in type, but I do not suppose this will be possible for some few months hence.

"Messrs. Rowe, White & Co. have selected a very fine position, at least I consider it so, it has three frontages and facing Ceylon, it is also very close to the important working machinery exhibit of Messrs. David Bridge & Co., and further nearly every one will have to pass it to go to the Conference Lecture Room, Club Room and the Dining Hall.

"Thanking you for your Association's support."

Notes and Comments by the Scientific Officer.

75. *Root Disease of Hevea*.—From time to time specimens of Hevea stumps which have died of Root disease are sent to this office. The large majority of these prove to have been attacked by *Hymenochaete noxia*, which appears to be the most common root fungus in Southern India.

White threads are common on all dead, or dying, stumps, and these may belong to any one of a hundred different fungi. They are merely the vegetative part, corresponding to the stem and leaves of a plant, and a fungus cannot be identified from them any more than many plants can be identified merely from their leaves. Flowers are necessary for identification in the case of a plant, and the fructification, or sporophyll as it is called technically, in the case of a fungus.

When white threads are found on the roots of Hevea they may belong to *Fomes semitostus*, a root disease which apparently does a considerable amount of damage in Ceylon and the Malay States, but on the other hand they may belong to a fungus which is simply living on dead wood. The sporophore of *Fomes* is an orange bracket, and this should be searched for on neighbouring dead stumps.

A circular published by the Royal Botanic Gardens, Ceylon, (Vol. V, No. 8) has just been received describing another root disease of Hevea, *Sphaerostilbe repens*, and in it Mr. Petch gives the following useful table of distinguishing features of Hevea root diseases :—

“(a). Root encrusted with sand stones, cemented together by brown or black mycelium—*Hymenochaete noxia*.

“(b). Root covered with white or yellowish stout cords of mycelium—*Fomes semitostus*. Fructification in the shape of overlapping plates, red brown above and orange beneath; usually occurs on a neighbouring stump. This stump must be extracted. Usually the stump is a jak, but the fungus has been found also on Bombax. The affected area must be trenched round.

“(c). No external mycelium; dark red or (when decayed) black strands running between the wood and the cortex of the root—*Sphaerostilbe repens*.”

In all cases, isolation of the diseased tree from the surrounding trees, by trenches, destruction by fire of dead stumps, and the free use of Lime are the methods of prevention to be adopted. These methods have been described in detail in Sc. O. Paper VI (*P. C.*, Vol. IV, p. 272) and some useful information will also be found on the subject especially applying to Rubber, in a lecture given by Mr. H. N. Ridley, the Director of the Singapore Botanic Gardens, which was reproduced in the *P. C.*, Vol. V/2, p. 435.

76. *Ammonia for Ceará*.—In some districts 5% Ammonia is run from drip tins down the tapping cuts made on Ceará trees to induce the flow of latex and prevent it from coagulating in the cuts and tins. When Ammonia is imported on to the estate in large quantities for this purpose Commercial Ammonia, which contains about 56% of Ammonia, should be bought, and not what the chemists call Liquor Ammonia Fort with a specific gravity of '880. The latter is very strong and in this climate dangerous to handle, and in opening, say, a 5 gallon drum a bad accident can easily occur. The Commercial Ammonia in 5 gallon drums, equal to about 50 lbs., costs in Bangalore 8½ annas a pound, and it can be easily and safely diluted to the desired strength.

RUDOLPH D. ANSTEAD,
Planting Expert.

THE PLANTERS' LIBRARY.

3.—Grenier's Rubber News.

For this fortnightly publication, it is claimed—doubtless with justice—that it is “the only paper of its kind in the East.” The numbers received contain something about tapping and other operations over which the planter has to exercise control, but perhaps more about markets, share markets, &c. They are decidedly interesting.

The paper is published by Messrs. Charles Grenier & Son, Kuala Lumpur, Selangor, F. M. S., and the subscription rate is \$4 (for India). The Secretary, U. P. A. S. I. has been asked to bring it to the notice of planters in South India. Hence these remarks.

The Editor writes concerning a *Rubber Annual* that is on the stocks :—
“We are bringing out a Rubber Annual just before Christmas. It will be profusely illustrated and will have about 100 illustrations depicting different phases of the Industry. It will be a handsome publication and will contain, among its reading matter, special articles by experts in Rubber.” The price of this is \$1, and to judge from specimen pages of some of the illustrations the “Annual” is likely to be an attractive publication.

4.—“Coffee Culture in the West Indies.”

Though intended for advertising purposes, this booklet—of which a copy has been supplied by Messrs. Peirce, Leslie & Co., Ltd., Calicut—contains a good deal of matter that deserves to be perused by the coffee planter in South India. It is published by the Agricultural Bureau, German Kali works, Havana, and can be obtained thence, free.

Methods of cultivation adopted in the West Indies are described at some length, and there are also remarks upon cultivation, plant foods, fertilizers, &c., of a more general character. There are also some excellent illustrations, including a very fine coloured plate showing “the effect of fertilizers on coffee,” as the result of experiments conducted by Mr. G. Helmrich in Guatemala.

The following excerpts may be taken as fair samples of the contents :—

“The one essential factor in choosing a variety is the market requirements. . . . Therefore, first ascertain the requirements of the market in which you expect to sell. Next choose the strain of coffee that will seemingly come nearest to producing what you want in the soil you have, considering the climatic conditions under which you are placed.

“The main problems in coffee cultivation are to keep the soil free from weeds, to keep it loose, to prevent it from washing and to maintain its fertility. . . . To prevent washing and maintain the fertility are serious problems in coffee cultivation. The weeds must be kept down and the soil must be loosened up at least immediately around the trees, but in doing so all through the plantation the soil becomes exposed and subject to washing and in a short time there will be nothing left but a clay bank without either humus or available plant food. Many methods have been tried to remedy this defect but none have given entire satisfaction. Ditches are often made at intervals at a right angle to the slope of the land which during heavy rains catch the trash and top soil washed down and thereby serves a good purpose. But instead of that, or in connection with that, some leguminous crops should always be allowed to grow in the centers between the rows during the rainy season, as long as the trees do not entirely shade the ground. This serves a double purpose. It prevents washing and it supplies humus as well as nitrogen. In the dry season such

vegetation can be cut down and spread around the trees as a mulch, by which means trees may withstand the ill effect of a dry spell when otherwise they would suffer. When the trees become large enough to entirely shade the ground there is not so much danger of washing as the soil will to some extent be held in place by the network of tree roots but it is always desirable to have some vegetation growing if possible in order to maintain the humus content."

"Results of experiments conducted by Gustav Helmrich in Finca Samac, Alta Verapaz, Guatemala."

Plat No.	Manuring per Year 1902-1906 inclusive.			Average Annual Yield per tree. 1902-1903.
1.	No Fertiliser	...	...	... 16'6 oz.
2.	2'4 oz. Double Superphosphate			
	5'8 " Sulphate of Potash			
	9'3 " Sulphate of Ammonia	...	...	... 24'1 oz.
3.	2'4 oz. Double Superphosphate			
	5'8 " Muriate of Potash			
	9'3 " Sulphate of Ammonia	...	...	... 32'3 oz.
5.	1'2 oz. Double Superphosphate			
	2'9 " Sulphate of Potash			
	4'6 " Sulphate of Ammonia	...	...	... 23'1 oz.
6.	1'2 oz. Double Superphosphate			
	2'9 " Sulphate of Potash			
	4'6 " Sulphate of Ammonia			
	$\frac{1}{2}$ wheelbarrow stable manure	...	...	... 46'1 oz.
8.	2'4 oz. Double Superphosphate			
	9'3 " Sulphate of Ammonia	...	...	... 38'3 oz.
9.	5'8 oz. Sulphate of Potash			
	9'3 " Sulphate of Ammonia	...	...	... 30'9 oz.
10.	2'4 oz. Double Superphosphate			
	5'8 " Sulphate of Potash	...	...	... 21'2 oz.

"All the trees received an application of 4'5 oz. lime per tree in 1903,

"These results show that the complete formula in No. 2 caused an increase in yield of 7'5 oz. per tree over plat No. 1 not fertilized. Plat No. 3 yielded an additional 8'2 oz. over Plat No. 2 from the use of Muriate of Potash instead of Sulphate. Plat No. 5 received exactly half the amount of fertilizer of Plat No. 2, causing a decrease in yield of 1 oz. per tree. Plat No. 6 was fertilized like Plat No. 5 but with an addition of one half wheelbarrow of stable manure which doubled the yield of plat No. 5 and nearly trebled that of Plat No. 1. Plats Nos. 8, 9 and 10 were fertilized like plat No. 2 but without potash, phosphoric acid and nitrogen respectively and judging from the results it would appear that the trees in these plats were in better condition than those in plat No. 2. Comparing the three, one with another, it shows that nitrogen exerted the greatest influence on the yield in that soil with phosphorus next and potash last. Looking at it from the standpoint of the general health of the tree the results were different, as shown in the . . . coloured chart. The plat fertilized without nitrogen shows small yellow leaves. The one without potash shows the leaves to be very yellow and many of them missing. The plat fertilized with potash and nitrogen and without phosphate shows large healthy leaves equal to those from the plat receiving the complete formula and very much superior to the ones of the unfertilized plat.

"While such definite results have not been obtained in the West Indies, experiments have shown; (1) That a fertilizer should contain the three necessary constituents, potash, phosphoric acid and nitrogen. (2) That the application of a well-balanced fertilizer is a paying investment provided it is used intelligently. (3) That the best results are always obtained where the fertilizer is used in connection with manure."

DISTRICT PLANTERS' ASSOCIATIONS. Coorg Planters' Association.

SCIENTIFIC OFFICER'S VISIT TO S. COORG.

A Meeting was held at the Bamboo Club on October 26th, 1910.

The following were present:—Messrs. Mann, W. Davies, G. Davies, R. Hamilton, A. J. Wright, A. H. Jackson, E. M. Breithaupt, Guy Breithaupt, J. W. Finlayson, J. S. Finlayson, H. G. Grant, Dr. Hiley, O. B. Achard, R. Hutson, R. Morton, Browne, Newberry, Ferguson, Tippetts, Garrett, F. Macrae, and R. D. Tipping, Secretary, C. P. A.

The Secretary introduced Mr. Anstead to the Meeting, and on behalf of the C. P. A. offered him a hearty welcome.

Mr. Anstead made some interesting remarks on all of the following subjects:—(1) The deterioration of Coffee-Curing, and suggested that quick drying be tried. (2) Mealy Bug. (3) Stump Rot. (4) Hybrids. (5) Cover plants. (6) Pepper Vine disease, and how to distinguish it. (7) Ceará Rubber. Its planting from seed and cuttings; the number of trees to the acre, 100 well grown trees being considered sufficient.

A general discussion then ensued in which the following subjects were also raised:—

Experimental Plots. Several gentlemen undertaking to carry out Mr. Anstead's instructions.

Nitrolim as a manure for Coffee.

The Meeting concluded with a cordial vote of thanks to Mr. Anstead for his interesting discourse, which will be more fully reported upon by him in the *Chronicle*.

Mrs. Tipping was "at Home" to her friends afterwards at the Club, where a large gathering spent a pleasant evening.

Mr. Anstead's Lecture.

Mr. Chairman & Gentlemen,

The last time I visited this district I had time to do little more than get an idea of the country and meet some of the planters. On this occasion I have a little more time to spare, not so much as I should like, it is true, but still, time to go round in a more leisurely way and go into a few matters in detail.

I have come here this afternoon not so much to lecture as to meet you and discuss matters of local interest with you. Your Secretary has asked me to speak about one or two things and there are also one or two matters I want to say something about myself, and after that I shall be glad if you will bring up anything you wish to discuss, and tell me things which you may think I should know, and if any of you care to ask me any questions I will gladly do my best to answer them to the best of my ability.

From what I have seen of the Coffee the last few days I think that it looks very well indeed, and though apparently you have not got a particularly heavy crop this year, still the trees look healthy and I see a berry or two in places. With the present improvement in prices I trust that the Coffee planter is going to have his turn at last, and I am sure he deserves to hold a no trumper after all these years of spades.

At the last meeting of the U.P.A.S.I. there was a good deal of discussion about the reputed deterioration of South Indian Coffee, and I was asked to pay special attention to the subject. Mr. Tipping has kindly arranged for

me to see the curing works and machinery at Hunsur and to go into the matter of Curing thoroughly. I hope that none of you expect that I can tell you straight away how to improve the quality of your coffee—if you do, you will be disappointed. It is a difficult subject and may take years of careful, patient work, for to begin with we do not know exactly what it is which produces quality. Dr. Lehmann did a lot of valuable spade work on the subject, but as you know arrived at no conclusion. Personally, I am not altogether convinced yet that the coffee has deteriorated, and I fancy that if it were not such a glut in the market we should not hear so much about deterioration. That, however, is merely a personal opinion.

As far as curing is concerned I have only one suggestion to make at present, and that is that the coffee should be dried more quickly and thoroughly than is customary on the estates. It is, I admit, only a guess, but I have an idea that coffee dried right out by artificial heat, as it was in some places in the West Indies, is of a better quality than that which is dried slowly. If any experiments are conducted in coffee curing I should like to see them conducted along these lines, but this is a matter which can be discussed in detail on some other more fitting occasion.

I do not think I can tell you any more about Mealy Bug than has already been said in the *P. C.* The lime and sulphur, and tobacco wash do not exterminate the bug by any means, but they do enable you to bring your supplies on and get them established, and more than that we cannot hope for. A pest which works underground is a most difficult one to get at and to deal with.

Stump rot is a disease to which I think you should pay special attention. There are two kinds of this disease, or perhaps they are two phases of the same disease. In the one case, near a jungle stump the coffee trees will die out suddenly. If one is dug up, the tap root will be found to be rotten and the collar covered with a cement-like mass of earth and stones bound together by a black charcoal-like mass of fungus (specimen shown). This is the pucca disease. In the other phase the trees take perhaps years to die, but the roots gradually die off and rot and the primaries die one by one (specimen shown). Much of this is put down to Mealy Bug, and wash, and half a dozen other things, but over and over again it is really a root disease and it began with the felling of jungle trees. So many trees produce this stump rot after they have been killed that all should be regarded with suspicion. Whenever the disease occurs, isolation by means of a trench is the only preventative method to adopt, and this trench should enclose a big area. It is of little use to merely dig the trench close round the dead tree, it should enclose at least a row of apparently healthy trees around the dead one. The space inside the trench should be dug deeply and thoroughly, all the roots in it taken out and turned and a heavy dressing of unslaked lime applied. New shade should then be planted and the plot treated like a new clearing. When the old shade is to be removed, the trees should be pollarded only so as not to kill them outright, and then the stumps must be dug out as completely as possible when there is time to do so. Also these stumps should be burned. I know quite well that that is impracticable, but I tell you to do it because that is really what should be done, were it possible. Stump rot is really an important disease which is doing a great deal of harm in some districts and produces large patches of shack looking coffee which cannot be brought back into good heart. The removal of all stumps and of as many roots as possible, a heavy dressing of lime, and the establishment of new shade is the best way of tackling such patches.

As you are aware, I am very anxious to see a better jāt of coffee grown than the present Arabian, and I think that this could be produced by

hybridisation. In many places in S. India good hybrids already exist, and since I have been in the district I have seen some very good ones here. These are hybrids between Arabian and Liberian coffee, and they make big vigorous plants, bear heavy crops, and are disease-resistant as far as borer and leaf disease are concerned. To get what is needed, constant selection is necessary, but when the perfect hybrid has been obtained I think it could be propagated by cuttings. This work I should like to see continued on scientific lines, and Mr. Jackson has undertaken to experiment, or rather to continue his experiments, for he has for years been doing some work along these lines, and I hope that afterwards he will tell us something about it. In all that has been said lately about coffee hybrids it has always, apparently, been taken for granted that the hybrid must be between Arabian and Liberian, but this is not the case at all, and I should like to see hybrids produced between other species of coffee, for instance, Arabian & Maragogipe. I hope that the Government are about to give the Nilgiri Planter a piece of land on which to conduct hybridisation experiments under the control of the Curator of the Government Gardens and myself, where work on definite systems can be carried out. This will be of immense advantage to coffee planters generally.

Cover crops have been experimented with in several places since my last visit, and I find that a lot of interest has been aroused in this subject. I have brought specimens of a number of suitable plants to show you. It is of little use calling these by the local names given to them by the natives, as these differ from district to district, and the name "Choukate," for instance, is applied to entirely different plants in different districts. After all, it is just as easy to remember that the name of a certain plant is *Cassia hirsuta* as that it is "Yallowry!"

(Specimens of *Cassia hirsuta*, *Crotalaria quinquefolia*, *Sesbania aculeata*, *Indigofera trifoliata*, *Indigofera tinctoria*, and several others were shown).

The much talked of *Tephrosia purpurea* I noticed growing in quantity by the road side between the two toll gates on my way up to Pollibetta last Sunday.

When I was here last year I called attention to the presence of Pepper Vine disease in the district, and the late Commissioner asked me to write a simple account of it with instructions how to deal with it. This he kindly published in English and Canarese in the *Official Gazette* for the benefit of the ryots. The disease is still noticeable, and those of you who are interested in Pepper should take steps to control it and follow out the recommendations made by Mr. McRae, which were published in the *Planters' Chronicle* (P.C., Vol. IV, p. 353, and Vol. V/1, p. 13). The disease is caused by a root fungus. Many vines just now will be seen with yellow leaves which are rapidly falling off and in some cases this is due to "wet feet" and the vines will recover with drier conditions. In this case, however, the leaves remain in a normal position till they fall off. When the vine is attacked by the disease the leaves slope towards the stem and give the vine a drooping, wilted appearance, and it rapidly dies outright. Such vines should be pulled down, dug up, and burned.

I have been asked to say something about Ceará rubber, and I will preface my remarks on this subject by saying that I firmly believe that there is a big future before Ceará in Coorg. The trees recover from tapping wounds in a very remarkable way. I have been shown some trees which have been hacked about most disgracefully and in many districts they would have died from such treatment, out here they heal up perfectly.

It is best to plant Ceará from cuttings taken from trees of known good yielding qualities rather than from seed. Seed will not all come true, and

a great deal of variation is to be found between the individual trees. Cuttings should be planted in a nursery, panded, and kept rather dry, and should only be put out when well rooted. If seed is used, small nursery plants should be put out in preference to big ones. Before tapping commences the outer bark should be removed, and this should be done 3 weeks to a month before any tapping is done, to allow the inner bark to harden. In some places as much as 3 months is needed, but here with your rapid growth, a month is probably long enough. As you have no difficulty with the healing of wounds, a herring-bone system of tapping should be adopted on a quarter of the stem surface. Arrangements have been made for me to see the tapping which is being done in the district, and I shall probably have more to say on the subject after I have seen it. The trees are usually planted closely together, but finally an acre will not carry much more than 100 trees, I think, and when they are two or three years old thinning out must be begun. There are several ways of doing this. Some planters remove every other row, others every other tree, but I think a better plan is to take out all the small weakly plants, a few each year. This will leave the lining irregular, but that does not much matter and does away with the necessity of removing big trees because they happen to fall in the row to be removed. The trees to be eliminated should be tapped with a close spiral till they die, so as to get as much rubber out of them as possible.

It now remains for me to thank you for the cordial welcome and patient hearing which you have accorded me, and I hope that we shall have a discussion on the points I have raised and others of interest.

BRAZILIAN COFFEE.

The present firmness in the value of coffee, writes the Rio correspondent of the *Economist* under date September 14th, is no doubt mainly the result of alarming cables sent to consuming quarters concerning the current prospects for the 1911-1912 crop. The dry weather in the interior of Sao Paulo has, of course, delayed the usual flowering, and according to some reports they have been materially affected by the drought, and are not now in a position to give a good flowering. The situation is certainly an anxious one to the coffee trade, and news regarding the state of the weather and plantations is eagerly demanded every day. Some of the leading export firms in Santos have sent representatives up to the interior to examine and report on the actual condition of the trees. Fortunately a break in the drought has come at last, rains having fallen all over the State except in Sao Carlos, Bragança and Taubaté, on the 11th instant; since then the weather has remained very unsettled, and more rain is probable. Flowering should become general during the second fortnight of the current month, but it will be difficult to advance any reliable opinion on the ultimate results before the end of October. The high prices ruling have naturally stimulated remittances from the interior, and receipts in Santos for the past two or three days have averaged more than 100,000 bags. There has been no official confirmation of the reported suppression of the 5 francs surtax during the coming crop, and as the suspension of the tax could not be made without the consent of the subscribers to the £15,000,000 loan, it seems probable that the report is without foundation. Exchange continues to rise, and is now over 18*d.* per milreis, the current rate of the Banco do Brasil for 90 days' sight on London being 18½*d.* The foreign banks now follow suit, and even quote a higher rate at times, instead of being invariably 1-32*d.* to 1-16*d.* under the Banco do Brasil, as they were a short time ago. The market is very firm, and the more optimistic already talk of 20*d.* being reached within the next month or so.

SELECTED CUTTINGS.**Causes of Soil Fertility.**

In the Opening Address by Mr. A. D. Hall, M.A., F.R.S., Chairman of the Agricultural Sub-section of the British Association Meeting at Sheffield, recently, there is much to interest every planter. A review was published in last week's issue of this paper (Vol. V, No. 41, p. 543), but a full report is preferable, and this is now given.

Mr. Hall said :—

I believe it is customary for anyone who has the honour of presiding over a section of the British Association to provide in his presidential address either a review of the current progress of his subject or an account of some large piece of investigation by which he himself has illuminated it. I wish I had anything of the latter kind which I could consider worthy to occupy your attention for the time at my disposal ; and as to a review of the subject, I am not without hopes that the sectional meetings themselves will provide all that is necessary in the way of a general review of what is going forward in our department of science. I have, therefore, chosen instead to deal from an historic point of view with the opinions which have prevailed about one central fact, and I propose to set before you this morning an account of the ebb and flow of ideas as to the causes of the fertility of the soil, a question which has naturally occupied the attention of everyone who has exercised his reason upon matters connected with agriculture. The fertility of the soil is perhaps a vague title, but by it I intend to signify the greater or less power which a piece of land possesses of producing crops under cultivation, or, again, the causes which make one piece of land yield large crops when another piece alongside only yields small ones, differences which are so real that a farmer will pay three or even four pounds an acre rent for some land, whereas he will regard other as dear at ten shillings an acre.

If we go back to the seventeenth century, which we may take as the beginning of organised science, we shall find that men were concerned with two aspects of the question—how the plant itself gains its increase in size, and, secondly, what the soil does towards supplying the material constituting the plant. The first experiment we have recorded is that of Van Helmont, who placed 200 lb. of dried earth in a tub, and planted therein a willow tree weighing 5 lb. After five years the willow tree weighed 169 lb. 3 oz., whereas the soil, when redried, had lost but 2 oz., though the surface had been carefully protected meantime with a cover of tin. Van Helmont concluded that he had demonstrated a transformation of water into the material of the tree. Boyle repeated these experiments, growing pumpkins and cucumbers in weighed earth, and obtaining similar results, except when his gardener lost the figures, an experience that has been repeated. Boyle also distilled his pumpkins, &c., and obtained therefrom various tars and oils, charcoal and ash, from which he concluded that a real transmutation had been effected, "that salt, spirit, earth, and even oil (though that he thought of all bodies the most opposite to water) may be produced out of water."

There were, not, however, wanting among Boyle's contemporaries men who pointed out that spring water used for the growing plants in these experiments contained abundance of dissolved material, but in the then state of chemistry the discussion as to the origin of the carbonaceous material in the plant could only be verbal. Boyle himself does not appear to have given any consideration to the part played by the soil in the nutrition of plants, but among his contemporaries experiment was not lacking. Some

instinct seems to have led them to regard nitre as one of the sources of fertility, and we find that Sir Kenelm Digby, at Gresham College in 1660, at a meeting of the Society for Promoting Philosophical Knowledge by Experiments, in a lecture on the vegetation of plants, describes an experiment in which he watered young barley plants with weak solution of nitre, and found how their growth was promoted thereby; and John Mayow, that brilliant Oxford man whose early death cost so much to the young science of chemistry, went even further, for, after discussing the growth of nitre in soils, he pointed out that it must be this salt which feeds the plant, because none is to be extracted from soils in which plants are growing. So general has this association of nitre with the fertility of soils become, that in 1675 Evelyn writes: "I firmly believe that where saltpetre can be obtained in plenty we should not need to find other composts to ameliorate our ground;" and Henshaw, of University College, one of the first members of the Royal Society, also writes about saltpetre: "I am convinced, indeed, that the salt which is found in vegetables and animals is but the nitre which is so universally diffused through all the element, (and must therefore make the chief ingredient in their nutriment, and by consequence all their generation), a little altered from its first complexion."

But these promising beginnings of the theory of plant nutrition came to no fruition: the Oxford movement in the seventeenth century was but the false dawn of science. At its close the human mind, which had looked out of doors for some relief from the fierce religious controversy with which it had been so long engrossed, turned indoors again and went to sleep for another century. Mayhow's work was forgotten, and it was not until Priestly and Lavoisier, De Saussure, and others, about the beginning of the nineteenth century, arrived at a sound idea of what the air is and does that it became possible to build afresh a sound theory of the nutrition of the plant. At this time the attention of those who thought about the soil was chiefly fixed upon the humus. It was obvious that any rich soils, such as old gardens and the valuable alluvial lands, contained large quantities of organic matter, and it became somewhat natural to associate the excellence of these fat, unctuous soils with the organic matter they contained. It was recognised that the main part of a plant consisted of carbon, so that the deduction seemed obvious that the soils rich in carbon yielded those fatty, oily substances which we now call humus to the plant, and that their richness depended upon how much of such material they had at their disposal. But by about 1840 it had been definitely settled what the plant is composed of and whence it derives its nutriment—the carbon compounds which constitute nine-tenths of the dry weight from the air, the nitrogen, and the ash from the soil. Little as he had contributed to the discovery, Liebig's brilliant expositions and the weight of his authority had driven this broad theory of plant nutrition home to men's minds; a science of agricultural chemistry had been founded, and such questions as the function of the soil, with regard to the plant, could be studied with some prospect of success. By this time, also, methods of analysis had been so far improved that some quantitative idea could be obtained as to what is present in soil and plant, and, naturally enough, the first theory to be framed was that the soil's fertility was determined by its content of those materials which are taken from it by the crop. As the supply of air from which the plant derives its carbonaceous substance is unlimited, the extent of growth would seem to depend upon the supply available of the other constituents which have to be provided by the soil. It was Daubeny, Professor of Botany and Rural Economy at Oxford, and the real founder of a science of agriculture in this country, who first pointed out the enormous difference between the amount of plant food in the soil

and that taken out by the crop. In a paper published in the Philosophical Transactions in 1845, being the Bakerian Lecture for that year, Daubeny described a long series of experiments that he had carried out in the Botanic Garden wherein he cultivated various plants, some grown continuously on the same plot and others in a rotation. Afterwards he compared the amount of plant food removed by the crops with that remaining in the soil. Daubeny obtained the results with which we are now familiar, that any normal soil contains the material for from fifty to a hundred field crops. If, then, the growth of the plant depends upon the amount of this material it can get from the soil, why is that growth so limited, and why should it be increased by the supply of manure, which only adds a trifle to the vast stores of plant food already in the soil? For example, a turnip crop will only take away about 30 lb. per acre of phosphoric acid from a soil which may contain about 3,000 lb. an acre; yet, unless to the soil about 50 lb. of phosphoric acid in the shape of manure is added, hardly any turnips at all will be grown. Daubeny then arrived at the idea of a distinction between the active and dormant plant food in the soil. The chief stock of these materials, he concluded, was combined in the soil in some form that kept it from the plant, and only a small proportion from time to time became soluble and available for food. He took a further step, and attempted to determine the proportion of the plant food which can be regarded as active. He argued that since plants only take in materials in a dissolved form, and as the great natural solvent is water percolating through the soil more or less charged with carbon dioxide, therefore in water charged with carbon dioxide he would find a solvent which would extract out of a soil just that material which can be regarded as active and available for the plant. In this way he attacked his Botanic Garden soils, and compared the materials so dissolved with the amount taken away by his crops. The results, however, were inconclusive, and did not hold out much hope that the fertility of the soil can be measured by the amount of available plant food so determined. Daubeny's paper was forgotten; but exactly the same line of argument was revived again about twenty years ago, and all over the world investigators began to try to measure the fertility of the soil by determining as "available" plant food, the phosphoric acid and potash that could be extracted by some weak acid. A large number of different acids were tried and, although a dilute solution of citric acid is at present the most generally accepted solvent, I am still of opinion that we shall come back to the water charged with carbon dioxide as the only solvent of its kind for which any justification can be found. Whatever solvent, however, is employed to extract from the soil its available plant food, the results fail to determine the fertility of the soil, because we are measuring but one of the factors in plant production, and that often a comparatively minor one. In fact, some investigators—Whitney and his colleagues in the American Department of Agriculture—have gone so far as to suppose that the actual amount of plant food in the soil is a matter of indifference. They argue that as a plant feeds upon the soil water, and as that soil water must be equally saturated with, say, phosphoric acid, whether the soil contains 1,000 or 3,000 lb. per acre of the comparatively insoluble calcium and iron salts of phosphoric acid which occur in the soil, the plant must be under equal conditions as regards phosphoric acid, whatever the soil in which it may be grown. This argument is, however, a little more suited to controversy than to real life; it is too fiercely logical for the things themselves, and depends upon various assumptions holding rigorously, whereas we have more reason to believe that they are only imperfect approximations to the truth. Still, this view does merit our careful attention, because it insists that the chief factor in plant production must be the supply of water to the plant, and that soils differ

from one another far more in their ability to maintain a good supply of water than in the amount of plant food they contain. Even in climate like our own, which text-books describe as "humid" and we are apt to call "wet," the magnitude of our crops is more often limited by want of water than by any other single factor. The same American investigators have more recently engrafted on to their theory another supposition, that the fertility of soil is often determined by excretions, from the plants themselves, which thereby poison the land for a renewed growth of the same crop, though the toxin may be harmless to a different plant which follows it in the rotation. This theory had also been examined by Daubeney, and the arguments he advanced against it in 1845 are valid to this day. Schreiner has, indeed, isolated a number of organic substances from soils—di-hydroxy-stearic acid and picoline-carboxylic acid were the first examples—which he claims to be the products of plant growth and toxic to the further growth of the same plants. The evidence of toxicity as determined by water-cultures requires, however, the greatest care in interpretation, and it is very doubtful how far it can be applied to soils with their great power of precipitating or otherwise putting out of action soluble substances with which they may be supplied. Moreover, there are as yet no data to show whether these so-called toxic substances are not normal products of bacterial action upon organic residues in the soil, and as such just as abundant in fertile soils rich in organic matter as in the supposed sterile soils from which they were extracted.

As, then, we have failed to base a theory of fertility on the plant food that we can trace in the soil by analysis, let us come back to Mayow, and Digby, and consider again the nitre in the soil—how it is formed and how renewed. Their views of the value of nitrates to the plant were justified when the systematic study of plant-nutrition began, and demonstrated that plants can only obtain their supply of the indispensable element nitrogen when it is presented in the form of a nitrate; but it was not until within the last thirty years that we obtained an idea as to how the nitre came to be formed. The oxidation of ammonia and other organic compounds of nitrogen to the state of nitrate was one of the first actions in the soil which was proved to be brought about by bacteria, and by the work of Schloesing and Muntz, Warrington and Winogradsky, we learnt that in all cultivated soils two groups of bacteria exist which successively oxidise the ammonia to nitrites and nitrates, in which latter state the nitrogen is available for the plant. These same investigators showed that the rate at which nitrification takes place is largely dependent upon operations under the control of the farmer; the more thorough the cultivation, the better the drainage and aeration, and the higher the temperature of the soil, the more rapidly will the nitrates be produced. As it was then considered that the plant could only assimilate nitrogen in the form of nitrates, and as nitrogen is the prime element necessary to nutrition, it was then an easy step to regard the fertility of the soil as determined by the rate at which it would give rise to nitrates. Thus the bacteria of nitrification became regarded as a factor, and a very large factor, in fertility. This new view of the importance of the living organisms contained in the soil further explained the value of the surface soil, and demolished the fallacy which leads people instinctively to regard the good soil as lying deep and requiring to be brought to the surface by the labour of the cultivator. This confusion between mining and agriculture probably originated in the quasi-moral idea that the more work you do the better the result will be; but its application to practice with the aid of a steam plough in the days before bacteria were thought of ruined many of the clay soils of the Midlands for the next half-century. Not only is the subsoil deficient in humus, which is the accumulated debris

of previous applications of manure and vegetation, but the humus is the home of the bacteria which have so much to do with fertility.

The discovery of nitrification was only the first step in the elucidation of many actions in the soil depending upon bacteria; for example, the fixation of nitrogen itself. A supply of combined nitrogen in some form or other is absolutely indispensable to plants and, in their turn, to animals; yet, though we live in contact with a vast reservoir of free nitrogen gas in the shape of the atmosphere, until comparatively recently we knew of no natural process except the lightning flash which would bring such nitrogen into combination. Plants take combined nitrogen from the soil, and either give it back again or pass it on to animals. The process, however, is only a cyclic one, and neither plants nor animals are able to bring in fresh materials into the account. As the world must have started with all its nitrogen in the form of gas, it was difficult to see how the initial stock of combined nitrogen could have arisen; for that reason many of the earlier investigators, laboured to demonstrate that plants themselves were capable of fixing and bringing into combination the free gas in the atmosphere. In this demonstration they failed, though they brought to light a number of facts which were impossible to explain, and only became cleared up when, in 1836, Hellriegel and Wilfarth showed that certain bacteria, which exist upon the roots of leguminous plants, like clover and beans, are capable of drawing nitrogen from the atmosphere. Thus they not only feed the plant on which they live, but they actually enrich the soil for future crops by the nitrogen they leave behind in the roots and stubble of the leguminous crop. Long before this discovery experience had taught farmers the very special value of these leguminous crops; the Roman farmer was well aware of their enriching action, which is enshrined in the well-known words in the *Georgics* beginning, "Aut ibi flava seres," where Virgil says that the wheat grows best where before the bean, the slender vetch, or the bitter lupin had been most luxuriant. Since the discovery of the nitrogen-fixing organism associated with leguminous plants, other species have been found resident in the soil which are capable of gathering combined nitrogen with the assistance of any host plant, provided only they are supplied with carbonaceous material as a source of energy whereby to effect the combination of the nitrogen. To one of the organisms we may with some confidence attribute the accumulation of the vast stores of combined nitrogen contained in the black virgin soils of places like Manitoba and the Russian steppes. At Rothamsted we have found that the plot on the permanent wheat field which never receives any manure has been losing nitrogen at a rate which almost exactly represented the differences between the annual removal of the crop and the receipts of combined nitrogen in the rain. We can further postulate only a very small fixation of nitrogen to balance the other comparatively small losses in the drainage water or in the weeds that are removed; but on a neighbouring plot, which has been left waste for the last quarter of a century, so that the annual vegetation of grass and other herbage falls back to the soil, there has been an accumulation of nitrogen representing the annual fixation of nearly a hundred pounds per acre. The fixation has been possible by the *azotobacter* on this plot, because there alone does the soil receive a supply of carbohydrate, by the combustion in which the *azotobacter* obtained the energy necessary to bring the nitrogen into combination. On the unmanured plot the crop is so largely removed that the little root and stubble remaining does not provide material for much fixation.

Though numerous attempts have been made to correlate the fertility of the soil with the numbers of this or that bacterium existing

therein, no general success has been attained, because probably we measure a factor which is only on occasion the determining factor in the production of the crop. Meantime, our sense of the complexity of the actions going on in the soil has been sharpened by the discovery of another factor, affecting in the first place the bacterial flora in the soil, and, as a consequence, its fertility. Ever since the existence of bacteria has been recognised, attempts have been made to obtain soils in a sterile condition, and observations have been from time to time recorded to the effect that soil which has been heated to the temperature of boiling water, in order to destroy any bacteria it may contain, had thereby gained greatly in fertility, as though some large addition of fertiliser had been made to it. Though these observations have been repeated in various times and places, they were generally ignored, because of the difficulty of forming any explanation: a fact is not a fact until it fits into a theory. Not only is sterilisation by heating thus effective, but other antiseptics, like chloroform and carbon bisulphide vapour, give rise to a similar result. For example, you will remember how the vineyards of Europe were devastated some thirty years ago by the attacks of phylloxera, and though in a general way the disease has been conquered by the introduction of a hardy American vine stock which resists the attack of the insect, in many of the finest vineyards the owners have feared to risk any possible change in the quality of the grape through the introduction of the new stock, and have resorted instead to a system of killing the parasite by injecting carbon bisulphide into the soil. An Alsatian vine-grower who had treated his vineyards by this method observed that an increase of crop followed the treatment even in cases where no attack of phylloxera was in question. Other observations of a similar character were also reported, and within the last five years the subject has received some considerable attention, until the facts became established beyond question. Approximately the crop becomes doubled if the soil has first been heated to a temperature of 70° to 100° for two hours, while treatment for forty-eight hours with the vapour of toluene, chloroform, &c., followed by a complete volatilisation of the antiseptic, brings about an increase of 30 per cent. or so. Moreover, when the material so grown is analysed, the plants are found to have taken very much larger quantities of nitrogen and other plant foods from the treated soil; hence the increase of growth must be due to larger nutriment and not to mere stimulus. The explanation however, remained in doubt until it has been recently cleared up by Drs. Russell and Hutchinson, working in the Rothamsted laboratory. In the first place, they found that the soil which had been put through the treatment was chemically characterised by an exceptional accumulation of ammonia, to an extent that would account for the increased fertility. At the same time, it was found that the treatment did not effect complete sterilisation of the soil, though it caused at the outset a great reduction in the numbers of bacteria present. This reduction was only temporary, for as soon as the soil was watered and left to itself the bacteria increased to a degree that is never attained under normal conditions. For example, one of the Rothamsted soils employed contains normally about seven million bacteria per gram, a number which remains comparatively constant under ordinary conditions. Heating reduced the numbers to 400 per gram, but four days later they had risen to six million, after which they increased to more than forty million per gram. When the soil was treated with toluene a similar variation in the number of bacteria was observed. The accumulation of ammonia in the treated soils was accounted for by this increase in the number of bacteria, because the two processes went on at about the same rate. Some rearrangements were effected also in the nature of the bacterial flora; for example, the group causing nitrification was eliminated,

though no substantial change was effected in the distribution of the other types. The bacteria which remained were chiefly of the class which split up organic nitrogen compounds into ammonia, and as the nitrate-making organisms which normally transform ammonia in the soil as fast as it is produced had been killed off by the treatment, it was possible for the ammonia to accumulate. The question now remaining was, what had given this tremendous stimulus to the multiplication of the ammonia-making bacteria? and by various steps, which need not here be enumerated, the two investigators reached the conclusion that the cause was not to be sought in any stimulus supplied by the heating process, but that the normal soil contained some negative factor which limited the multiplication of the bacteria therein. Examination along these lines then showed that all soils contain unsuspected groups of large organisms of the protozoa class, which feed upon living bacteria. These are killed off by heating or treatment by antiseptics, and on their removal the bacteria, which partially escape the treatment, and are now relieved from attack, increase to the enormous degree that we have specified. According to this theory, the fertility of a soil containing a given store of nitrogen compounds is limited by the rate at which these nitrogen compounds can be converted into ammonia, which, in its turn, depends upon the number of bacteria present effecting the change, and these numbers are kept down by the larger organisms preying upon the bacteria. The larger organisms can be removed by suitable treatment, whereupon a new level of ammonia production, and therefore of fertility, is rapidly attained. Curiously enough, one of the most striking of the larger organisms is an amoeba akin to the white corpuscles of the blood—the phagocytes, which, according to Metchnikoff's theory, preserve us from fever and inflammation by devouring such intrusive bacteria as find entrance in the blood. The two cases are, however, reversed: in the blood the bacteria are deadly, and the amoeba therefore beneficial, whereas in the soil the bacteria are indispensable, and the amoeba become noxious beasts of prey.

Since the publication of these views of the functions of protozoa in the soil, confirmatory evidence has been derived from various sources. For example, men who grow cucumbers, tomatoes, and other plants under glass are accustomed to make up extremely rich soils for the intensive culture they practise, but, despite the enormous amount of manure they employ, they find it impossible to use the same soil for more than two years. Then they are compelled to introduce soil newly taken from a field and enriched with fresh manure. Several of these growers here have observed that a good baking of this used soil restores its value again; in fact, it becomes too rich, and begins to supply the plant with an excessive amount of nitrogen. It has also been pointed out that it was the custom of certain of the Bombay tribes to burn vegetable rubbish mixed, as far as possible, with the surface soil before sowing their crop, and the value of this practice in European agriculture, though forgotten, is still on record in the books on Roman agriculture. We can go back to the Georgics again, and there find an account of a method of heating the soil before sowing, which has only received its explanation within the last year, but which in some form or other has got to find its way back again into the routine of agriculture. Indeed, I am informed that one of the early mysteries, many of which we know to be bound up with the practices of agriculture, culminated in a process of firing the soil preparatory to sowing the crop.

My time has run out, and I fear that the longer I go on the less you will feel that I am presenting you with any solution of the problem with which we set out—"What is the cause of the fertility of the soil?" Evidently there

is no simple solution ; there is no single factor to which we can point as *the* cause ; instead, we have indicated a number of factors any one of which *may* at a given time become a limiting factor and determine the growth of the plant. All that science can do as yet is to ascertain the existence of these factors one by one and bring them successively under control ; but, though we have been able to increase production in various directions, we are still far from being able to disentangle all the interesting forces the resultant of which is represented by the crop.

One other point, I trust, my sketch may have suggested to you ; when science, a child of barely a century's growth, comes to deal with a fundamental art like agriculture, which goes back to the dawn of the race, it should begin humbly by accepting and trying to interpret the long chain of tradition. It is unsafe for science to be dogmatic ; the principles upon which it relies for its conclusions are often no more than first approximations to the truth, and the want of parallelism, which can be neglected in the laboratory, gives rise to wide divergencies when produced into the regions of practice. The method of science is, after all, only an extension of experience. What I have endeavoured to show in my discourse is the continuous thread which links the traditional practices of agriculture with the most modern developments of science.

In Proceedings of the Agricultural Society of Trinidad and Tobago, August 1910, appears the following note on "The Origin of Wheat," which may be said to convey a hint not unworthy of the notice of Coffee Planters who are bent on improving their strains. The discovery of the progenitor of all varieties of Coffee has not yet been reported, but there is room for speculation as to whether there is such a plant in existence, its habits, and its disease and weather resistant powers. The "original stock," if to be had, might be of material use in hybridisation experiments.

"The announcement made by the Bureau of Plant Industry of the United States Department of Agriculture that the progenitor from which has sprung, through innumerable selections, all our varieties of wheat, has been discovered in the northern part of The Holy Land is not only interesting from a botanical point of view but opens a wide field for experimental work which may prove of great economic importance. The discoverer, Dr. Aaron Aaronsohn, Director of the Agricultural Station at Haifa, Palestine, observes that the plant is very hardy and reports it is doing equally well in depression five hundred feet below sea-level and in mountain ranges 6,300 feet high. It is very common in historic Galilee. The original wild wheat plant resists drought, cold and even heat to a remarkable degree, and it is pointed out that by selecting seeds from the different habitats occupied by the wild plant we may speedily evolve strains suited to almost any climate. Experiments are already on foot with a view of introducing the plant in the unirrigated desert regions of Western North America."

The *Bulletin Commercial* (Brussels) of 1st October states, on the authority of the Belgian Legation at Caracas, that the coming coffee crop of Venezuela will fall short of that of the preceding year, which amounted to about 700,000 sacks (of 60 kilogs.), the estimate for this year being only 600,000 sacks. The State of Aragua alone is likely to give a normal return. The deficit is attributed to the sudden arrival of the spring rains and to drought during the period of the formation of the berry. Venezuelan coffees are said to be of good quality and to fetch high prices, the quotations at Caracas on 1st September being from 70 to 80 bolivars per sack (47s. to 54s. per cwt.)

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Scientific Officer's Papers.

XLVI.—SECOND TOUR IN COORG.

Leaving Bangalore on 22nd October I made a short tour, for the second time, in Coorg, my previous visit to that district having been made in December 1909. On this occasion arrangements were made which enabled me to spend a week in South and a week in North Coorg, and to visit several Coffee Estates in each of these districts, as well as some Ceará rubber plantations. I was also able to make a journey down the Sumpage Ghaut to see the Pará rubber at the lower elevations.

I had the pleasure of lecturing at two well attended meetings, one held at Pollibetta on 26th October, and one at Mercara on 31st October, and discussing with planters points of local interest, and arranging for the conduction of a number of interesting experiments with the experiment committees in each district.

Many of the points of special interest to Coorg were dealt with in my lectures, and I would refer to that published in the *Planters' Chronicle*, Vol. V/2 p.549.

I was especially interested in the Coffee hybrids existing in the district, and Mr. A. H. Jackson has undertaken to continue this valuable work on scientific lines. The special object in Coorg should be to raise a strain of Coffee which will not so much give an increased yield, but be resistant to leaf disease, black rot, and mealy bug. The existing hybrids are highly resistant to the first of these diseases, and possibly to the second. Mealy Bug continues to be a serious pest, and will probably never be entirely eradicated, but if a resistant variety can be obtained, and it is grown with the precautions recommended by Mr. Lefroy, which were fully described in the first report I had the honour to make upon Coorg, (*P.C.*, Vol. V/1, p.3) it will cease to give much trouble. That these precautions are worth taking is obvious from the results obtained by those who have adopted them. The use of basket plants grown in soil medicated with lime and sulphur, and the use of tobacco and soap for young plants in the field, enables supplies to be brought on to a stage when they are strong enough, and have a root system wide enough, to resist the bug, as witness the vigorous supplies on estates like Du Barri, and others.

Another way of improving the strain of coffee is by far too much neglected, and that is by careful selection of seed. In this connection I would quote the following paragraphs from a paper on "Selection and the Cacao Industry" recently read before the Trinidad Agricultural Society by Dr.

Fredholm. If the word coffee be substituted for cacao in this extract, every word of it applies to the coffee industry of South India.

"To increase the bearing capacity of the cacao trees, and to improve the quality of the product placed on the market, should be the aims of every cacao planter. It is certain that these results cannot be gained if the old haphazard methods of planting are continued. It is not enough to know that a cacao plant is a cacao plant, but *before we place it in the ground* we should know that it is of a kind likely to do well on the soil and in the surroundings which we can give it, that a certain yield can be expected from it, and that a certain grade of cacao will be produced from its beans. Only careful selection can give these results. To selection is due the many fine and remunerative varieties of fruit trees of the temperate climes. The plants cultivated as field crops have been enabled by similar methods. Cross-fertilisation is also resorted to in order to evolve new and superior strains."

"The cultivation of cacao has been greatly extended in many parts of the world within late years, and, although the consumption of it has increased, the time must come when so keen a competition will take place, and the profits from cacao cultivation will become so small, that only estates producing the greatest quantities of the best qualities will be able to exist. No matter with what care and at what expense a planter may cultivate his estate, nothing will avail, if he has not the right kinds of cacao. A miscellaneous lot of trees, such as are now met with on estates, will surely lead the owners to ruin. On the other hand trees bearing large crops of a fine grade will meet all competition. It costs no more to care for a tree of a good strain than for a mongrel."

Does not this warning apply equally well to Coffee? Coffee planted six by six, that is 1,200 trees per acre, needs only to ripen 140 berries per tree to yield a cwt. per acre. It is the low grade trees which pull down the total yield, and how many of these are there per acre? The greatest care should be taken about the seed used for nurseries. It should be selected in the first place only from trees which are known to be good croppers, and then the whole sample should be sorted over by hand and only the very best, full, perfectly shaped, beans selected for sowing. - This means time and trouble, but it is well worth it to ensure obtaining a tree of the best possible type. Haphazard sowing of unselected seed is bound to result in a number of trees that no amount of cultivation or manuring will make bear heavy crops, and it is the high percentage of these on an estate which results in poor crops, quite as much as bad blossom showers.

As I pointed out in my lecture at Pollibetta, Stump Rot is a disease which is doing an immense amount of harm in all our coffee districts. Poor patches of shuck looking trees which spread year by year, shed their primaries, and refuse to respond to manure, are nearly always due to this fungoid disease originating from a stump of a jungle tree or shade tree which has been felled among the coffee. These patches should be isolated by trenches as quickly as possible to prevent them spreading, and the coffee from them should be picked separately and not mixed with the main sample. Light beans and discoloured coffee spoiling the whole sample is often due to the admixture of coffee from these patches. The dead stumps must be dug out, the coffee trees uprooted and burned, the land deeply forked with a heavy dressing of unslaked lime, and then the patch planted up again with new plants and new shade like a new clearing. This is expensive work so it is important to isolate and tackle the patches as soon as they show up and before they become of a large area. It is better to spend money in renewing them at once, than continually wasting it by trying to bring them back into good heart. Big stumps are not easy to remove, and various means have

been suggested for uprooting them. A Trehwella Jack will be found useful once the coolies learn to use it. It is of little use putting this into the hands of untrained labour, as a good deal of judgment is needed to use the jack at the right angles to get the utmost mechanical efficiency out of it. The possibility of dynamiting big stumps has been suggested, and in this connection the following description of the method as described by the E. I. Du Pont de Nemours Powder Co., Wilmington, Del., U. S. A., are of interest. The earth is taken out underneath one side of the stump, until the main root is found; an opening one foot deep is dug near this, and a hole two inches in diameter is bored in it, at a place one foot below the surface line, and at an angle of 35 to 40 degrees. After the charge has been inserted and exploded the stump is removed to about two feet below the surface. In a careful record which was kept of work of this kind it was found that 325 pine stumps, averaging $28\frac{1}{2}$ inches in diameter, were removed at a cost, including dynamite, fuse, and blasting caps, of a little more than 18 cents (18 annas) per stump.

Different districts vary very much in the kinds of trees which produce stump rot. Thus is Coorg both the Goni and the Silver Oak are bad offenders, while neither of these are included in the list of trees known to produce it in South Mysore (Note 9, P. C., Vol. V/1, p. 44). So many stumps, however, do start the disease that in the present state of our knowledge we cannot afford to trust any of them, and when it is necessary to remove a shade tree it should first of all be isolated by digging a deep trench round it, and then pollarded until the stump can be removed altogether.

Encouraged by the success that has been obtained by painting Pará rubber trees with Bordeaux mixture in the dry weather as a prevention against Pink Disease, it has been arranged to try a similar means of preventing Black Rot on coffee. Experiments in this direction will be carried out during next February and March in North Coorg, and will be watched with interest by all coffee planters.

The use of leguminous green dressings is being taken up in the district, and experiments are being tried with a number of different plants. On this occasion I noticed, among others, the following plants which are most suitable for the purpose:—Several species of *Indigofera*, *Sesbania aculeata*, *Cassia mimosoides*, *Cassia hirsuta*, *Sophora glauca*, *Crotalaria quinquefolia*, while *Tephrosia purpurea* is a very common plant by the road side all the way from Hunsur to the top toll gate on the Pollibetta road. I would like to call attention to Mr. Jackson's new clearing near the gymkhana ground at Pollibetta which has been grown with two crops of legumes, and approximates to perfection to my mind.

Ceará rubber has immense possibilities in the district, especially in South Coorg. We have still much to learn about it, especially about the tapping of it, but a great deal has already been learned, and the way tapping wounds heal up is remarkable. As the trees get older and the bark thickens, paring will be possible, and may replace the present system of making a new cut at each tapping which is wasteful of bark. On young trees it is quality of tapping which counts, and the greatest care must be taken not to wound the cambium. The bark is so thin when the trees are young that very careful work is needed not to wound the cambium, so that tapping is slow and the yield small, and the percentage of scrap high. As the trees increase in age these difficulties will become less and less.

The trees are planted closely in most places and already require to be thinned out. Finally 100 to 120 trees per acre will be as much as the land will carry. Thinning out must be done judiciously, and a system of cutting out every alternate tree, or row of trees, is not to be recommended, for this

results in the loss of big trees while often poor ones are left. All the poor trees, and those with few branches, over which their neighbours have already met, should be cut out, as also those which have shown themselves to be bad yielders of latex. This will tend to leave the trees in blocks, but that is of little consequence. The roots of trees which have been removed should be completely taken out and burned, as if left in the ground root disease will be encouraged and is sure to give trouble in Coorg.

In the Pará plantations which I saw I found Pink Disease to be present, and I would call attention to the preventative measures which have been adopted in Cochin against this pest.

I understand that a secondary industry to coffee is needed where Ceará will not grow, and I would suggest to planters seeking for such that they should consider the possibility of Lime growing for Citrate, which is a paying industry in the West Indies. Citrus grows readily in Coorg, and it is possible that it would be worth while to experiment with this cultivation.

I am gratified to find that since my last visit Lime has been applied to many estates with great benefit. A difficulty exists in obtaining good lime at a reasonable price, and I would suggest to the Planters' Association the possibility of burning their own lime on a co-operative plan, on the lines adopted with success by Mr. Mathias in South Canara. (See P. C., Vol. V, p. 475). With the object of discovering the best sources of limestone in the district I have arranged to have samples sent to me from the various sources in the district for analysis at my laboratory. It is most important that planters should be able to obtain a high grade of lime at a reasonable price, to enable them to apply it to their estates in sufficient quantities to do any good.

In conclusion my sincere thanks are due to Mr. R. D. Tipping for his kindness in making detailed arrangements for my transport during my tour, and to many planters of the district for their kindness and hospitality. I was unfortunate in the weather conditions during the first part of my tour, but under any conditions it is always a pleasure to visit this charming little "Wales without the sea."

RUDOLPH D. ANSTEAD,

Planting Expert.

At a meeting of the General Committee of the Indian Tea Association, Calcutta, held on the 25th ultimo a letter dated 18th October 1910 from the Government of Bengal was read, intimating that His Honor the Lieutenant Governor had been pleased to sanction a contribution of Rs.4,000 per annum for a further period of five years with effect from the 1st April 1911, towards the cost of the scientific researches being undertaken by the Association. The letter had in the meantime been acknowledged with the General Committee's best thanks and was now ordered to be recorded. The Government of India's reply to the Association's request for a continuance of their support was being awaited.

The steady and consistent way in which financial support has been given by Governments to the Scientific Department of the above Association is worthy of note in view of the fact that in Southern India also the support originally given by various Governments was promised only for a short time of years. What has occurred in respect to the Indian Tea Association inspires hopes regarding the future of the Scientific Department of the U. P. A. S. I.

Notes and Comments by the Scientific Officer.

77. *Growth of Pará Rubber.*—With reference to Mr. J. R. Vincent's letter on this subject which appeared in the *Planters' Chronicle* last May (Vol. V/1, p. 205), he now writes me as follows:—

"It may interest you to know that on measuring my trees in June I was able to forecast the number of trees I should have tappable on October the first by means of my system of measurements and calculation. My forecast was sufficiently close to be remarkable, as I was only wrong by 300 and odd trees on an area of 400 acres."

The system of measurement will obviously prove of great practical value when estimating the future yield of an estate.

78. *Porcupines and Rubber.*—Rubber planters are constantly waging war against rats and porcupines which do a considerable amount of damage, and I would call attention to the following suggestion for fighting these pests made by Mr. E. E. Green, the Government Entomologist, Ceylon, in his 'Entomological Notes' published in the August number of the *Tropical Agriculturist*:—

"Various applications have been tried, with but partial success, to safeguard young rubber trees against the attacks of rats and porcupines. The following extract, from 'The Year-Book of the Department of Agriculture' (U.S.A.), may possibly provide a useful remedy:—

"During the last year the lime-and-sulphur wash, which for a number of years has been employed to prevent damage to trees by the San José scale, was tried with great success in several localities as a protection for orchard trees against the attacks of rabbits. The remedy is cheap, and as a rule, a single treatment in the fall appears to protect trees for the entire winter."

"The lime and sulphur mixture may be prepared by boiling together 3 lbs. of Quicklime, 3 lbs. of Flowers of Sulphur, and 6 gallons of water, until the amount of liquid is reduced to 2 gallons. For spraying the foliage of plants, this mixture is diluted with 100 parts of water, but as a protection against rats and porcupines, it should be applied as a paint of about the density of white-wash."

79. *Seed of Tephrosia purpurea.*—Mr. H. C. Sampson, the Deputy Director of Agriculture, Southern Division, Trichinopoly, has recently called attention to the fact that he is receiving applications from planters in the Wynaad and Coorg for seed of *Tephrosia purpurea*, which he calls "Wild Indigo," and he suggests that it would be better if this seed was obtained through the office of the U. P. A. S. I.

At present Mr. Sampson has not got more seed than he requires for his own Division and consequently he has to obtain further supplies from a Seed Farm which is 45 miles from the railway. This, as he points out, causes delay, as bandies are not sent without a full load.

Arrangements have therefore been made to hold a stock of seed at this office, which can be obtained, on application to the Secretary of the U. P. A. S. I., at low rates.

Mr. Sampson further informs us that the natural seed only germinates at about 16%, but if treated with Sulphuric Acid it germinates at about 80%, while if trodden by cattle in sharp sand for 2 hours it germinates at from 40 to 45%.

Particulars of the Sulphuric Acid treatment will be obtained; and it is intended to treat the seed before it is supplied to planters.

RUDOLPH D. ANSTEAD,

Planting Expert.

CORRESPONDENCE.

Crotalaria striata.

The following is an extract from a letter received at this Office on the subject of *Crotalaria striata* as a cover crop and green dressing. It raises one or two interesting points, and the Scientific Officer hopes that planters who have experimented with *Crotalaria* will send answers to the questions asked by his correspondent, and give planters generally the benefit of their experience.

"I have here a few acres (8) of *Crotalaria striata* grown from seed purchased from Ceylon. The seed was sown last May, in drills 2 feet apart, over a flat part of my this year's new clearing (Rubber) at the rate of 5 lbs. per acre. The germination was so successful that the area under it is now completely covered, the growth most luxuriant and about 5 ft. high. I am so pleased with the experiment that I am desirous of putting my future clearings under the same cover.

"The cost of the seed at the *lowest*, landed here, is about 8 annas per lb., so you see for a large area, say 500 acres, this item of expenditure amounts to a good deal. I would like to reserve this plot I have and harvest my own seed for next season, but am doubtful about the advisability of doing so. I am well aware that, besides the idea of a cover of legumes to reducing the recurring cost of weeding, to secure the full benefit of such a cover, it should be dug into the soil when in full bloom. I should be much obliged if you could let me know therefore:—

"(1.) Whether the resultant benefit will be the same, if the *Crotalaria* is dug in *after* the crop is harvested?

"(2.) or if this is done whether it will have any deleterious effect on the growth of the rubber—or in any way materially affect the natural richness of the soil—or rather I should say—the plant food available in the soil.

"I am afraid I express myself very badly, but I feel sure you follow me. I might mention that where the *Crotalaria* is, the soil is *very* rich and full of humus. I expect it to begin flowering as soon as the N-East monsoon is over—about November or December.

"Could you, or any of the numerous readers of the *P. C.*, also let me know—

(1.) How many lbs., of seed one acre or *Crotalaria striata* can be expected to yield—sown 5 lbs. to the acre?

(2.) How many (the minimum) lbs. is it necessary to sow per acre to get a good cover?

(3.) Is April or May (*i. e.*, with the blossom showers) the best time to sow the seed?

(4.) Is it best sown in drills or broadcast?"

[COMMENT BY THE SCIENTIFIC OFFICER.]

Crotalaria is a perennial, that is to say it does not die down each year after flowering, so that it may be left to seed, and the crop gathered before it is cut down. As a rule when left in this way it grows to a large size and develops into a shrub with thick stems. This, is not an advantage, as the plant is apt to contract Pink Disease and other pests, but if seed is a desideratum, it may be left. The resultant benefit to the Rubber from the green dressing will be the same, and no deleterious effect will result.

The best way to use a cover crop is to cut it down at the beginning of the dry weather and leave it on the surface of the ground as a mulch to

prevent the soil being dried out and baked by the sun. Digging soon becomes impossible in Rubber on account of the roots which should not be cut. The mulch rots down and the plant food in it is carried into the soil and reaches the surface roots of the rubber.

I believe that it is usually considered that about ten pounds of seed are necessary to sow an acre, and the best time to sow is from April to May, just before the rains. As a rule it should be drilled in, and some useful information upon this point will be found in the *Planters' Chronicle*, Vol. IV, p. 237.

Mr. Maynard, writing from North Mysore (*P. C.*, Vol. V, p. 97) said, "I find it is not a good plan to broadcast *Crotalaria*, as it will not do in June on account of too much rain, and September is too late, as it does not get enough growth before the dry weather. The best plan is to make a nursery early in May and plant out in the estate 2 feet apart in August, and in that way get it 6 feet high."—R. D. A.

All the Mocha coffee grown in the world comes from the Yemen, a Turkish province in the south-western part of Arabia, and is so called because the entire crop was formerly shipped from Mocha. The trade is wholly divided between Hodeida and Aden, the bulk of it going from the latter port. Coffee can be grown successfully, probably, in any of the mountainous parts of the Yemen, but its cultivation is, in fact, confined to a few widely scattered districts, and the acreage is relatively small. In raising Coffee for export the Arab realises a good profit in money when his trees yield their crop and it is sold. But he must wait four years after planting, during which time the cost of labour is heavy on him, before his trees begin to yield; and the main desideratum with him is not money but food. In consequence the Yemen Arab devotes little of his land to coffee and very much excellent coffee land to dhurra, a plant resembling Indian corn. He gets 16 crops of dhurra while waiting for one of coffee, and is sure that his family is safe from starvation.

Several other important causes have contributed to restrict the increase in coffee cultivation. Bad condition of trade routes, the dangers due to political disturbances, lack of irrigation systems, inadequate tools, over-worked land, and the exorbitant dues levied in transit may all be mentioned as having assisted in keeping the production of Yemen coffee, which finds such a ready market in Europe and America that the supply is never in sight of the demand, to its low mark.

Of all Yemen and Mocha coffee the best is known is Mehtari, from the district of Beni Mehtar, lying almost due south of Sanaa. Another nearly, if not quite, as good comes from Yafi, near Taiz. Other kinds that are considered superior are Sharsh, Menakha, and Hifash. It is said that all these coffees are the same variety and that the superior quality of any kind is due wholly to the curing. In Beni Mehtar the coffee lands are held by large and wealthy proprietors whose means enable them to hold their crop for some time after it is gathered. The berries picked in September are accordingly stored away and allowed to cure all winter. The bean is thus dried out thoroughly before it is hulled and brought to market. This accounts for the clear almost translucent yellow color of the finest berries when they reach the market. But the planters in the other districts are compelled to sell their crops quickly in order to tide over the winter. Hence, they pick the fruit before it is properly ripened and hull the berry before it is properly dried. As a result the color is pale and lifeless, the flavour weak and flat, compared with the berry cured within the hull.

The present season is regarded as very promising; the trees are vigorous and well loaded with berries.

RUBBER.

The Rational Bleeding of Hevea.

The following is a translation of an article in the *Journal d'Agriculture Tropicale*, which gives a Review by Professor Labroy of a paper by Mr. John. Parkin, entitled :

"Comparative Examinations of Hevea and Castilloa from the Point of View of Bleeding."

The excellent review "Science Progress" published under the auspices of the physiological Laboratory of London University, contains in its number for 15th January, 1910, a memoir by Mr. J. Parkin, constituting in our view a substantial contribution to the study of the culture of Hevea in Malaya.

This new contribution of the learned physiologist whom the *J. d' A. T.* counts among its active collaborateurs deals especially with the theory of bleeding and the curious phenomenon of the reaction, termed "wound response," brought forward by the experiments of Dr. Willis and of the author on the trees of Ceylon, and advances some personal views which will interest all engaged in rubber cultivation.

In the first part of his work Mr. Parkin examines the different sources of rubber ; he outlines the significant decline of the African types, points to the almost stationary, or slightly progressive, standing of Brazilian production, and concludes categorically in favour of cultivated rubber.

The author refers especially to the immense plantations in the Indo-Malayan region, which appear to him to offer the best future prospects owing to the considerable advance they have gained over other countries, by the positive results already obtained. Admitting, he says that the price of Rubber may fall to three shillings per lb., a possible event within the next ten years, when the entire produce of these plantations will have reached 100,000 tons, it can be affirmed without fear that the exploitation of Asiatic Hevea will not cease to be remunerative.

Granted that the methods of extraction of latex and the preparation of Rubber now in use on plantations are considered sufficiently satisfactory, it does not of necessity follow that they have attained perfection. In reality, writes Mr. Parkin, the new industry is barely out of the experimental stage, and not only requires the practical knowledge of the planter, but equally the services of the botanist, the chemist and, above all, the biological chemist.

The author regrets that more care has not been taken in the selection of seed, in the first planting of Hevea, and puts planters on their guard against the danger of the dissemination of an inferior type already in evidence on numerous properties. A serious alteration in the price of Rubber coincident with higher cost of labour would necessitate the utmost importance of judicious selection in the exploitation of Hevea.

For the technique of this operation we refer to the work of M. G. Vernet in No. 73, *Journal d'Agriculture Tropicale*.

The experiments conducted from 1898-1899 at Peradeniya and at Henaratgoda by Willis and Parkin have demonstrated that Hevea subjected to repeated bleeding behaves differently to Castilloa when treated in an identical manner, for while in the case of Hevea the flow of latex will be stimulated up to a certain point by the repetition of the bleeding, it is stated to be proved, in the case of Castilloa, that after one or two consecutive bleedings, the flow of latex either becomes weakened or entirely ceases. After having revealed this particular phenomenon on Hevea, the experiments established not less decisively that incisions bordering on or coincident with the previous wounds

give a yield in latex superior to the wounds on distant parts of the same tree. The reaction has not been found appreciable after an interval of twelve hours but has been apparent at the end of twenty-four hours, and appears to have obtained its maximum 48 hours later. This delay has nothing absolute and rests solely on climatic influence. A medium drought, for instance, retards the phenomenon. As a general rule, bleeding is repeated at two days intervals, some proprietors preferring the result of daily bleeding.

Another series of experiments, due to Messrs. Parkin and Stanley Arden, indicates that an abundant flow corresponds with a latex containing little rubber or body.

By the absence of all reaction in bleeding *Castilloa*, Parkin is brought to ascribe an opinion but little encouraging to our readers, a statement which should be compared with the termination of our article No. 103, p. 8. *Castilloa*, says he in substance, will give *ounces* of Rubber per annum, while *Hevea* produces *pounds*, and after ten years the yield will be from 4 to 5 ounces for *Castilloa* and from three to four pounds for *Hevea*. Furthermore, does it not appear that the Central American tree may yield place still further to that of Brazil, as the economic conditions relating to the exploitation of these two species is better understood?

One can explain the cause of the phenomenon of reaction, common to *Hevea*, by the particular structure of its laticiferous system, by the fact that a wound excites a flow of latex and water towards the point operated upon with the apparent object of repairing the tissues. If we accept this reasonable line of argument we can easily understand why the latex exuding from the first incision always appears less easily gathered and more rich in rubber, and of a different character to that obtained from later bleedings. It is here that "drip-tins," described and figured in our last issue, have their uses. At the second bleeding the latex appears in greater abundance and less thick, modifications which accentuate each following operation.

The percentage of Rubber (a factor which must not be lost sight of) after maintaining a more or less uniform character for three or four months, becomes weaker and indicates the necessity of a desistance, for a time, in the carrying on of bleeding operations.

With the continuous laticiferous system observed in *Castilloa* and other rubber yielding plants, Mr. Parkin compares the articulated system of *Hevea*, where the continuity of vessels is but imperfectly obtained by a rupture, more or less complete, of the horizontal cell walls. As the result of this anatomical difference the first incision on the trunk of *Castilloa* empties the total latex from the adjoining tubes, while a corresponding wound on *Hevea* will give a flow very much less in volume. From this response to a single wound *Castilloa* has been considered a better producer than *Hevea*, but we know to-day that repeated bleeding after a few days interval yields no practical results.

The totally different manner in which *Hevea* responds appears to be due to a lactiferous system less communicative with the various parts, which constitutes a closer network endowed with greater activity. Have we not here some hypotheses on the different laticiferous systems whose claims are worthy of a very careful microscopic investigation? It is necessary to remark that *Manihot glaziovii* does not present any manifest reaction on bleeding, although its laticiferous system does differ essentially from that of *Hevea*.

One other problem, which has been the study of physiologists for years, without definite agreement, is that concerning the functions of the latex. Among others Baillon, Schullerus, and up to a certain point Treub,

appear to consider the latex as a food reserve, and the laticiferous system a substitute for sieve tubes. Dr. Spence has come round to this view lately, in making an oxidizing action responsible for the elaboration as active food of the rubber globules stored up as reserved food, to which we shall have occasion to return. M. G. Vernet has gone further and laid down a principle that the rubber, or the substances which compose it, play an immediate alimentary rôle.

The latex has been represented equally as playing a rôle of protector against insects and parasitic fungi; but the theory that Mr. Parkin has maintained for many years agrees with that of Doctor Warning, who shows that the laticiferous system is, above all, a magazine for the storage of reserves of water, destined to counteract the effect of drought. He rests his opinion on the fact of the abundance of latex, its fluidity augmenting with the humidity of the soil, and shows that his hypothesis is verified by the fact that the extraction of latex does not seriously affect the vegetative conditions of the trees while the injury caused by successive bleeding would result in sloughing or discharging wounds.

On the practical point of view Mr. Parkin does not express any well defined opinion on the best system of bleeding adapted to the rational exploitation of Hevea. Among the methods, proceeding by *oblique incisions* and repuncturing of bark, his preference seems to us to place in the half herring-bone system employed on the majority of plantations.

This system has the advantage of only cutting in the course of the year one line of bark corresponding to the fourth of the circumference of the trunk of the tree at a height of five feet above the soil. It also has the further advantage of allowing four years to elapse before the same bark is tapped twice over the same points. It satisfies also the desired economy.

The perfected tools possessed by the planter to-day restrict the limit of each tapping to the shaving off of a thin slice of bark not exceeding one millimetre in thickness, and avoid all wounds of the cambium while cutting in its vicinity, which is a sign of progress made on the methods of work originally used.

From the opinion expressed by the author, it would appear that the renewed bark which grows on the excised portions is equal to, if not superior to, the original bark.

It would seem from this statement that there is a certain analogy between Hevea and Cinchona, in which the second or renewed bark often furnished a yield of quinine above that obtained from the original.

And now what is the conclusion to be drawn from Mr. Parkin's work? Surely, that our knowledge of physiology applied to rational exploitation is increasing considerably and is slowly but surely being placed on a definite footing, which will permit the planter to operate, methodically, on lines or principles which will assure him the maximum of profit while leaving the trees in good condition.

(Signed) O. LABROY.

A new species of Coffee is said to have been found growing wild in the great Nandi forest in East Africa. About 8,000,000 shrubs are estimated to exist in that region.

SELECTED CUTTINGS.**The Control of Scale Insects in the British West Indies
by Means of Fungoid Parasites.**

The following paper by F. W. South, B. A., (Cantab.), Mycologist on the Staff of the Imperial Department of Agriculture for the West Indies, appears in the *West Indian Bulletin* :—

PART I.**GENERAL ACCOUNT.***Introduction.*

It has been recognised for a comparatively long time, that different species of fungi are able to attack the bodies of various living insects and eventually cause their death; but the epidemic nature of this attack, that is the hundreds of thousands of individuals that may be destroyed by the fungus, together with its economic importance, whether beneficial or the reverse, has only been recognised within the last forty years. Indeed, the use of these parasites in the control of various pests is of even more recent date, and cannot yet be said to have attained the greatest application of which it is capable. In fact, it is only within the last two years that the subject has received in the West Indies the attention of which it is worthy, and it may be directly stated, that the results of the observations and experiments conducted during that time offer every prospect of success in controlling scale insect attacks by means of their fungoid parasites.

The first important step in the recognition of the effect of vegetable parasites of insects on an economic scale, was the discovery of the bacterial disease of silk worms by Pasteur in 1870. The disease had occasioned considerable loss to the silk industry in France, but the recognition of its cause led to the suggestion of measures by which it could be prevented satisfactorily.

During the last twenty-seven years, in the United States of America, a considerable amount of work has been carried on having a directly opposite object, namely, the reduction of the numbers of various insect pests by means of their vegetable parasites, both bacterial and fungoid. This work has, on the whole, met with a fair measure of success, more especially in the damper and milder climates of the more Southern States. Among the insects experimented upon may be mentioned the cabbage caterpillar, the chinch bug, the grasshopper and various species of scale insects.

The scale insects, by virtue of their stationary habit, are particularly liable to attack by fungi, whose hyphae can grow under their scales and destroy their bodies. The usefulness, from an economic point of view, of the fungi attacking these insects has been exploited to the greatest extent in the State of Florida, where Professor Rolfs, of the State Experiment Station, first demonstrated, in 1897, the practical application of the red-headed fungus in the control of the San José scale. Subsequent work by various members of the Experiment Station staff has added very largely to our knowledge of such fungi, and of the conditions under which they may be successfully employed. More recently, information as to the occurrence and distribution of the fungoid parasites of various scale insects has been forthcoming from different parts of the world, including Cuba, Porto Rico, Martinique, Ceylon, South Africa, and Australia.

During the last year, information with regard to the distribution and effectiveness of these fungi in the various West Indian Islands has been collected by the officers of the Imperial Department of Agriculture, and the results, though at present far from complete, are embodied in this article,

which is intended as a preliminary discussion of the question, and an indication of the lines along which it is hoped subsequent work will be conducted. The fungi at present known to occur in these islands are: the red-headed fungus, *Sphaerostilbe coccophila*, Tull.; the white-headed fungus, *Ophionectria coccicola*, E. and E.; the black fungus, *Myriangium Duriaei*, Mont.; the shield scale fungus, probably *Sephalosporium lecanii*, Zimmermann.

GENERAL DESCRIPTION OF THE FUNGI FOUND IN THE WEST INDIES.

The following is a brief account of the more superficial characters of these fungi; the fuller and more technical description of them will be found in the last part of this article.

Red-Headed Fungus.—This most commonly appears as a small, conical, or club-shaped outgrowth from the scale attacked; it is usually inclined at an obtuse angle to the surface of the scale, and is from 1/40 to 1/2-inch or 1/2 to 3 millimetres length. The end of each outgrowth is bright-red in colour and somewhat horny in consistency. This is supported on a delicate, pinkish, velvety base. As many as five or six of these outgrowths, or *sporodochia*, may arise from a single scale. They are borne on an interwoven mass of the fungal hyphae, known as a stroma, which fills the space once occupied by the body of the dead scale insect. Another form of fructification may also be produced by the fungus. This consists of more or less spherical, smooth, bright-red perithecia, which are usually borne in groups of four or five on the same stroma as the other fruiting form. It must be remembered that the hyphae of this fungus are colourless and fine, and that consequently, when the fungus is not producing either of the forms of fructification described above, it is very hard to see, and may be present in large quantities and doing most effective work, although entirely invisible to the naked eye. Practically the only indication of its presence in this stage, visible without a microscope, is the large number of dead scale insects to be found on the host plant.

White-Headed Fungus.—This also has two forms of fructification, both produced, as in the case of the red-headed fungus, on a stroma occupying the body cavity, and also frequently covering the body, of the scale insect. The stroma is white or cream-coloured, and gives rise to a small, brown, cylindrical outgrowth about 1/2-millimetre long. When this becomes mature, it turns white at the top, owing to the formation of a more or less conical head of white spores. The second stage consists of numerous, more or less spherical, smooth perithecia of a coffee colour, which occur in groups on the stroma. Owing to the scattering of the conidia over the stroma, the fungus frequently appears white or grey in colour.

Black Fungus.—This appears as irregular, smooth, coal-black lumps on stems and branches of trees infected with scale insects; it rarely occurs in the leaves. The major portion of the black stroma, is of a brittle nature, somewhat like charcoal, and the stroma, as a whole, is of a definite appearance. These characters serve to distinguish it from black blight, to which, however, it bears in reality but little resemblance. This fungus also consists of fine, nearly colourless hyphae in its early vegetative stages, and probably kills many more scales than those on which its stroma actually appears. While useful on the stems and branches, this fungus is more disfiguring than the scales themselves when it occurs on the fruit. No instance of its occurrence there is, however, recorded at present in these islands, though it has been known to occur on fruit in Cuba.

Shield Scale Fungus.—This differs very considerably in appearance from any of the other three, its characters being more those of a mould. In

the early stages it kills the insects without any outward appearance of its presence such as would be visible to the naked eye. But when the scale is dead a white or slightly buff coloured fringe, often of a rather waxy appearance, grows out from beneath it over the surface of the leaf. The scale itself often becomes brown in colour and of a papery consistency, that is, if it is one of the soft shield scales. At an even later stage the whole surface of the scale insect becomes covered with a slightly buff-coloured coating of the fungus hyphae, and this often has a very powdery surface owing to the presence of very numerous heads of spores. The appearance is most characteristic, and when once seen cannot easily be mistaken.

EFFECTIVENESS OF THE FUNGI.

In treating of the red-headed fungus on the San José scale in Florida, Professor Rolfs remarks that the ordinary observer would overlook it altogether. This would hardly happen in the West Indies in places where the fungus is really active, and producing numerous fructifications, as the result is to give a quite definite pink appearance to the parts affected, even when they are viewed from a short distance. The above effect has been seen by the author on lime tree stems in Dominica; it is also mentioned by the Imperial Commissioner of Agriculture as having been even more noticeable in the case of a specimen of *Castilloa elastica* at the Agricultural School, St. Lucia, on which numerous parasitized scales occurred. These instances serve as an illustration of the effectiveness of this parasite under favourable conditions. In dealing with this point in this paper on 'Fungi Parasitic upon *Aleyrodes citri*,' Professor Fawcett, of the Florida State Experiment Station, remarks:—

'The effective work of this fungus (the red-headed fungus), and of two others, *Ophionectria coccicola*, E. and E., and *Myriangium Duriaci*, Mont., upon the orange scales, is readily shown by spraying an orange tree very thoroughly with Bordeaux mixture. During the summer and fall of 1907, the author sprayed a number of trees with Bordeaux mixture for another purpose. The trees were sprayed very thoroughly, once in May, once in July, and once in September. Before the first spraying, the trees were practically unhurt by *Mytilaspis citricola*, only a few individuals of the scale being found on any part of the trees. After the first spraying, this scale insect began to spread, and increased slowly in numbers until November, when the trees were badly attacked by the scale. Other trees, near by, that had received no spray, were as free from scale as at the first. The fungicide had evidently destroyed, on the sprayed trees, the fungi that had been all along working upon the unsprayed trees.'

Another instance illustrating the same thing is that afforded by Dominica. In this island there has been no serious trouble from scale insects since the year 1903, which succeeded the drought in 1902. Observations on material from the island show that this is to a considerable extent due to the luxurious growths of parasitic fungi, which have kept the scales in check for seven consecutive years.

In their paper on "Insects and Diseases of the Orange," Cook and Horne remark that the black fungus (*Myriangium Duriaci*) has less effect on the orange snow scale (*Chionaspis citri*) in Cuba, than any of the other fungi found there have on the insects, which they attack. In Dominica, however, it would appear to be more effective, for this scale practically never assumes serious proportions in that island, and could only be said to be of secondary importance in the serious outbreak of scale insects that occurred in 1903. The black fungus is very common on this scale, and probably is responsible to a very large extent for keeping it under control.

The same fungus occurs very commonly on this scale in Montserra. In this island, the snow scale was a very serious pest in the dry year 1903, but has never assumed serious proportions since, except in isolated instances where trees were suffering from drought. This indicates that there also, the black fungus is an efficient check on this scale. The white-headed, and the shield scale fungi (*Ophionectria coccicola* and *Cephalosporium lecanii*) are equally effective, as far as present observations show; but as the first only occurs in Dominica, it is not possible to state how useful it would be under the drier conditions experienced in some of the other islands. Experiments will, however, be made to introduce it more generally, as it is almost the most vigorous of these fungi, when under favourable conditions.

METHODS OF EMPLOYING THE FUNGI.

In some districts, where the general conditions are favourable to their growth, the parasites of certain species of insects exist naturally in large numbers. These parasites are responsible, under normal conditions, for the comparative rarity of these species in those districts. Such districts are usually spoken of as being unsuited to the species—a phrase which simply means that, in the battle between the host and the parasite, the natural conditions favour the parasite, and the numbers of the host are consequently kept at a minimum. Man's work in making use of these parasites is of two kinds; firstly, to introduce the parasite into districts in which the conditions are favourable to its growth, but in which it has not previously been known to occur; and secondly, to produce, where possible, by artificial means, conditions which are favourable to the parasites in districts where the conditions in general are not favourable. Some methods of achieving both of these objects will now be dealt with.

Three methods of introducing these fungi into fields where they have not previously been known to exist have been found to be successful in Florida, according to Dr. E. W. Berger, of the State Experiment Station; but time has not yet permitted of any very definite observations on their effectiveness in the West Indies.

The first method consists of spraying the spores and portions of the mycelium of the fungi on to the trees which it is intended to infect. For this purpose, leaves well infected with the fungus should be stirred up for ten to fifteen minutes in water; there should be about forty fructifications of the fungus, or more, to each pint of water. The mixture should then be strained through a fine wire mesh or a coarse muslin, and sprayed on to the trees. The author referred to above recommends that an iron sprayer or atomizer should be used for this purpose, or if the operation is to be conducted on a large scale, a compressed air sprayer with a galvanized iron receptacle. It seems, however, that if the liquid to be employed is carried in a galvanized iron bucket and not in a brass or copper receptacle, a brass syringe might be used with perfect safety provided it is emptied as soon as it has been filled, and had not previously been employed for fungicides. The spray should be as fine as possible, as the trees should be sprinkled only, not soaked, any water that runs off representing a direct loss of spores. If the above precautions are carefully attended to, it is usually found that this method of artificial infection is the most successful of the three. The fungus material for mixing with water may also be taken from pure cultures; purely technical methods are required to obtain these, but when once obtained, they could be kept constantly in stock in the Laboratory of this Department and distributed as required, thus enabling experiments to be carried on at those seasons of the year when fructifications of the fungi are not easily procurable in the field. When it is intended to infect only one or two trees for

experimental purposes, it may be found that a large glass syringe with as fine a delivery nozzle as possible is a good instrument for spraying the trees.

This method may be employed for all the species of fungi found in the West Indies, with the exception of the black fungus (*Myriangium Duriaei*), whose spores are formed in such a way that they would not necessarily be liberated when portions of it are shaken with water.

The second method, which is applicable to all the fungi, consists in tying infected material into trees which it is desired to infect. This should be done in such a manner that the fructifications of the fungi come into as close proximity to healthy scale insects as possible. This method, according to Dr. E. W. Berger, ranks second in order of efficiency in Florida, and should certainly yield successful results here.

The third method has not proved as successful as the other two, and has the additional disadvantage of being considerably more expensive in application. It consists in planting among the trees to be infected, small trees whose foliage is well infected with various parasitic scale fungi, so that the leaves of small trees come into contact with those of the larger ones. If necessary, such trees may be planted in pots or tubs and raised on platforms. This method has the disadvantage of not spreading the fungus as effectively over a wide area as in the other cases, and involves certain difficulties in watering in order to prevent the small trees from dropping their leaves.

The tying method is the one that commends itself as that most likely to be successful here, on account of the general conditions that prevail on estates; though spraying with spores will probably also prove useful, especially for a small number of trees.

In order to have a ready supply of these fungi always available, it is advisable, as far as possible, for every manager or planter, especially on lime estates, to be acquainted with some place where he can be certain of obtaining one or more of them. For this purpose, he should watch some particular tree known to be well infested, and when he notices that the scales are nearly all killed, should transfer the fungi to a neighbouring tree where there are scale insects in considerable numbers.

With regard to the artificial formation of conditions suitable to these fungi in localities where they are naturally unfavourable, there are two courses which may be followed. The main difficulties which have to be overcome are the effects of a bad drought, especially in the dry season, and those of wind.

In most of the islands, with the possible exception of Barbados and Antigua, the general conditions in the wet season are sufficiently favourable to permit of the fungi making good growth. Consequently, the only period when artificial help is necessary is during the dry season; it will probably be found that spraying one or two trees with clean water, once or twice a week, would enable the fungi to tide over the unfavourable conditions, and so afford a starting point from which they could spread again the wet season. The other method, which is especially applicable in windy places, or in localities where the wet season is not usually sufficiently well marked to ensure the spread of the fungi, is to allow the trees attacked by scale insects to become covered with a fairly thick growth of Bengal beans (*Mucuna pruriens*, var.) This method is particularly applicable to lime trees. It has been definitely proved, in Montserrat, that the covering of beans helps to clear the trees of scale insects. Evidence too, from other places, tends to support this, and to show that some fungi, at any rate, are more numerous in the damp sheltered conditions under the beans than is the case outside.

It is possible that some other factor or factors due to the beans, which are as yet undetermined, also weaken the scale insect attack. It may be of interest to note in passing, that the Bengal beans encourage the presence of insect parasites of the scales as well as of the fungoid parasites, as they afford shelter from the wind.

BENGAL BEANS.

As the use of the Bengal bean in connection with lime cultivation, is restricted as far as the author is aware, to the West Indies, and even there, is limited mainly to the island of Montserrat, some account of it may not be out of place here. The Bengal bean (*Mucuna pruriens*, var.) is closely related to the velvet bean (*Mucuna pruriens*, var. *utilis*), and to the 'cow itch' (*Mucuna pruriens*). The plant was first used in Montserrat purely as a green dressing, and it was in that island that the Honourable F. Driver, the manager of the Montserrat Lime Company's estates, accidentally discovered its useful effects in ridding lime trees of scale insects. The discovery was made about twelve years ago. The bean was used as a green dressing on a field of lime trees which was so badly attacked with scale insects that it was intended to remove the trees when the beans had died down, and replant it with young trees, for which the beans were intended as a manure. It was however discovered, that under the thick covering of beans the trees had considerably recovered from the scale insect attack, and had yielded a very fair crop of limes. In the previous year, practically no fruit had been obtained owing to the effects of the scale insect attack on the trees. Subsequent experience has shown that covering the trees with Bengal beans, in this way, always improves the health of the trees and reduces the number of scale insects on them.

In Montserrat, the beans are planted, four or five around each tree, at the commencement of the rains in May or June; they are allowed to grow until the beans are ripe in the following February or March, when the stems are cutlashed near the ground, and any portions of the vine hanging free from the tree are removed. The mass of vines, however, on the top of the tree is not disturbed. The trees frequently put out strong vigorous shoots 6 or 8 feet long, once the beans have been cutlashed, and show general improvement in health, and freedom from scale insects. The improvement appears to be more or less permanent. . . . While the trees undoubtedly benefit in general health, it is also well recognized that the size of the crop from trees covered in bean is reduced when compared with that from healthy trees not so covered, and further, on heavy soils or in wet districts, it seems possible that too thick a covering may be injurious to the lime trees, though under more normal conditions, it is usually found that the thicker the covering, the better is the effect on the trees. The injurious effect on wet soils might be overcome by watching the trees carefully, and if it appeared that the beans were having an ill effect, half of them might be cutlashed off near the ground and the remainder permitted to grow. In this way the covering would be considerably reduced in size, and probably the result would be favourable to the trees. It is hoped that further experiments in this direction may be shortly undertaken. It will also be remarked that the beans afford their maximum shelter to the trees during the wet season. Owing to the nature of the bean, it is at present impossible to form a covering to the lime trees during the dry season. It is, however, possible that by breeding from beans perpetually planted at or near the beginning of the dry season, the natural rhythm of the plant might be altered so that a strain might be produced which would give its maximum growth during part, at any rate, of the dry season. . . .

(To be continued.)

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Scientific Department.

At a General Meeting of the South Mysore Planters' Association, held at Chickanhully on the 10th and 11th November 1910, it was resolved :—

" 1. That this Association is in entire sympathy with the resolution passed at the recent meeting of the N.M.P.A. regarding the Scientific Officer Fund, and is of opinion that if sufficient funds can be secured the U.P.A.S.I. be requested to arrange for the deputation of a special Assistant to Mr. Anstead who shall devote himself solely to the interests of Mysore and Coorg. The qualifications required by such an Assistant shall be decided on by the three Associations in consultation with Mr. Anstead.

" 2. That the co-operation of the N.M.P.A. and the Coorg Association be invited.

" 3. That in order to secure the necessary funds to meet the above and all other Association expenditure the assessment be raised to 8 annas per every cultivated acre of Coffee and 2 annas per every cultivated acre of Cardamoms.

" This, however, shall be subject to confirmation by the next Annual General Meeting."

The Planting Member of Council.

The Hon'ble Mr. J. G. Hamilton expects to be in Madras about the end of this month. In case Honorary Secretaries of District Planters' Associations wish to communicate with him they can address him at the Mysore Club.

Control of Scale Insects.

On another page we publish a second (and final) extract from an important and interesting paper on the Control of Scale Insects in the West Indies. Planters in South India should derive profit from a study of this.

The great difficulty in controlling Scale Insects by means of Fungi which are parasitic upon them is to obtain suitable climatic conditions. Fungi will only grow well and rapidly in wet weather or in a moist atmosphere. On the Nilgiris there are two Fungi at least which are parasitic upon the Green Bug, and at the beginning of the monsoon they kill off the scale very rapidly. In the dry season, however, the fungi are not active and the scales get the upper hand, and it is just at this time that they do so much harm to the Coffee. If a culture of fungus spores were sprayed on to the bushes, they would have to be kept continually damp to enable the fungus to grow and this entails frequent spraying with water. In the district above mentioned, however, many estates have no water at all available during the dry weather. This should be borne in mind when Mr. South's article is studied.

International Rubber Exhibition, 1911.

Official intimation has been received by the Secretary that at a Meeting of the Advisory Committee of the International Rubber and Allied Trades Exhibition (1911) held at the London Chamber of Commerce on the 17th October 1910, the following Resolution was duly passed:—

“That this Meeting of the Advisory Committee of The International Rubber and Allied Trades Exhibition (1911) in recording its appreciation of the cordial co-operation and support given to the Exhibition, desires to tender its best thanks to the United Planters' Association of Southern India.

“At the same time, this Meeting expresses the hope that the Exhibition will be attended by the Representatives of this Association, who are assured of a hearty welcome.”

MANAGER'S REPORT.

The Manager's Report read at the above meeting stated, *inter alia*:—

I regret that our esteemed President, Sir Henry A. Blake, will not be able to be present on this occasion. He has, however, thrown his whole energies into the undertaking, has had many interviews with me and tendered valuable advice and suggestions.

When I had the pleasure of meeting many of you in May, 1908, the Exhibition of that year was practically in the initial stages, but upon this occasion not only has the preliminary work been done, but a very large proportion of the organisation has been completed, and the success of the 1911 Exhibition is assured by the displays (now in course of preparation) of crude rubber, manufactured goods, machinery and articles that come in the category of allied trades.

The support being extended to the coming Exhibition is unquestionably the result of the advice and assistance given by the Committee that brought the previous one to so successful a termination, and the valuable support of members of the present Hon. Advisory Committee in all parts of the world; and the undertaking has been placed in such a position as to secure itself against any financial loss. Some brief particulars may be gathered from the following information. Space has been reserved by—

Foreign Governments:—

All Dutch Colonies.
State of Manaos.
The Congo.
All German Colonies.

All French Colonies.
Federal Brazil.
State of Pará.

Others are now corresponding with a view to making exhibits.

British Governments:—

Ceylon.
The Gold Coast.
Trinidad.
Uganda.
British Guiana.

Federated Malay States and Straits Settlements.
Queensland.
Dominica.
British East Africa.

whilst Southern India, British Honduras and other British rubber-growing countries have arranged for displays.

Manufacturers:—Several leading British, German, French, Netherlands, and Russian manufacturers have secured space, either direct or through the Committees formed in their respective countries.

Machinery:—Both the Planters' and Manufacturers' Sections will be largely represented.

Germany:—This year, at the invitation of the Ständige Ausstellungskommission für die Deutsche Industrie of Berlin, I visited that city and was

most cordially received by Representatives of all sections of the Industry. The Committee referred to gave me their united support and called a special meeting to discuss the advisability of Germany being represented. The United Manufacturers' Association gave their unanimous support, and at a later date a special Committee was formed at the Imperial Colonial Office, Berlin, for the purpose of securing the proper representation of the German colonies, and the manufacturers, etc., of that country. Dr. H. Johannes, Consul-General for Germany, was appointed Commissioner to represent the Committee at the Exhibition.

Belgium :—At the request of the Exhibition Committee of this country I visited Brussels and discussed the Exhibition with the President, and the Government has, through the Consul-General, Mr. E. Pollet, intimated that Belgium will be officially represented and that a Commission will be appointed.

Holland :—I have received an intimation through Mr. H. S. J. Maas, the Consul-General for the Netherlands, that the Government will again be officially represented and the Commission, of which Mr. H. S. J. Maas is the Hon. President, is now awaiting confirmation. This country, in addition to many others, has reserved a very large space.

France :—All the Colonies have booked space officially, also many manufacturers, and I am now informed that it is proposed to appoint a special Commission.

Brazil :—A Commission is now in course of formation to represent that country, whose combined exhibit will be of considerable dimensions.

America :—A Committee has, unofficially, been formed in the States with the object of securing the representation of many of the Manufacturers.

The Right Hon. the Earl of Crewe, Secretary of State for the Colonies, honored the Exhibition by sanctioning invitations being sent through his Department to the Colonial Secretaries of the British Colonies, requesting them to send Delegates to England to represent their respective countries at the International Conference of Rubber Producers, Manufacturers and others interested in the Industry, and already replies in the affirmative have been received.

At this Meeting I feel it would be fitting to pass a Resolution that a similar invitation be sent to all the other countries exhibiting, asking them to send Delegates, and I am sure the request will meet with a most favorable response.

I would also like to see a Resolution passed and sent to the various Departments, Committees, &c., thanking them for the interest they have taken in, and the assistance given to, the Exhibition.

Instead of the separate Dinners as given in connection with the 1908 Exhibition, it is proposed to hold one to be called THE INTERNATIONAL RUBBER AND ALLIED TRADES BANQUET, at which no doubt many important personages will be present.

The following Trophies have been offered to the Committee :—

PRESIDENT'S TROPHY, given by Sir Henry A. Blake.

THE RUBBER GROWERS' ASSOCIATION (London), Gold, Silver and Bronze Medals.

INDIA-RUBBER JOURNAL (London), 100 Guinea Shield.

INDIA-RUBBER WORLD (New York), \$1,000 Cup.

Scientific Officer's Papers.**XLVII.—THE RÔLE OF HYBRIDISATION IN PLANT BREEDING.**

An important and interesting article under this heading from the pen of Professor East, of Harvard University, appeared in the October number of the *Popular Science Monthly*, and in view of the fact that a great deal of interest is being taken just now in Southern India in the possibility of hybridising Coffee, the following extracts from it are printed. The article is highly technical, and those who are interested in the subject, but not very well posted in its scientific details, are advised to refresh their memories by first re-reading the Sc. O. papers Nos. 23 and 24.

Professor East first of all points out the connection between hybridisation and selection, and formulates the main objects of the former. "There is intimate connection between the rôle of hybridization and the rôle played by selection. It comes about in this way. Inherited variations are produced by nature with considerable profusion. New characters appear and old characters are lost: these form the working basis of selection. But whether they are large or small they are usually inherited completely. They are the units of heredity; or, if they are sometimes transmitted in units of lesser degree, they may be compared to chemical radicals. The main object of hybridization then is the shuffling of these units in the first hybrid generation and their recombination in the next generation. There are, however, various phenomena attending hybridization, and I will endeavour to illustrate the following as those of most importance: (a) Recombination of characters and their fixation, (b) production of desirable combinations in the first hybrid generation and their continuation by asexual propagation, (c) production of fixed first generation hybrids, (d) production of blends."

The first cross having been made, Mendel's Law comes into play. "Certain characters are found in the hybrid that are identical with those possessed by the male parent and other characters the same as those possessed by the female parent. Other characters appear to have resulted from the blending of those of the two parents, while still others appear to be entirely new. The plant may be sterile if the cross is between widely differing species, but if it is fertile and the flower of the hybrid is self-fertilized, the plants resulting from this seed present still more surprises. For example, if one has crossed a pear-shaped yellow tomato with a round red tomato, in the second hybrid generation he will find individual plants bearing fruit of four kinds, pear-shaped yellow and round red, as were the two parents, and in addition pear-shaped red and round yellow. In other words all possible combinations occur and in definite proportions. Stated as a principle it may be said that where either of the parent plants possesses characters absent from the other, the potential characters remain pure in the germ cells of the hybrid and recombine as if by chance. This is the most important feature of the only law of heredity of which there is any exact knowledge—the law of Mendel."

The definite proportions of the combinations come about in this way. "The theory supposes that when a dominant and a recessive character meet in a cross, the germ cells which are produced in the hybrid do not blend these characters, but possess either the one or the other; and as the possession of their character is a matter of chance, on the average 50 per cent. will bear the dominant and 50 per cent. will bear the recessive character. In a plant, for example, 50 per cent. of the pollen cells would bear the dominant and the other 50 per cent. would bear the recessive character. One half of the egg cells, likewise, contain the dominant, and one half the recessive character.

"Now, if we could pick out at random any one hundred pollen, or male cells to fertilize any one hundred egg, or female cells, we can see that there are equal chances for four results. A dominant male cell might meet a dominant female cell, a dominant male cell a recessive female cell, and a recessive male cell a recessive female cell.

We have (D + D), (D + R), (R + D), and (R + R) plants formed in equal quantities, but as the two middle terms are the same, we can reduce the formula to one (D + D), two (D + R), one (R + R). But wherever there is a D present in the germ cell, the dominant character shows, while the recessive character is hidden. The one part, or 25 per cent., of the individuals showing the character (D + D) will appear just like the two parts, or 50 per cent., of the individuals having the character (D + R). Therefore, there will be 75 per cent. of the individuals which will show the dominant, or D character, while 25 per cent. will show the recessive, or R character. These 25 per cent. showing the R character will ever after breed true, because they contain nothing but the recessive character; while of the 75 per cent. showing the dominant character, one third, or those having the pure (D + D) character, will breed true in succeeding generations, while the other two thirds having the (D + R), or hybrid character, will again split in the next generation."

Let us interpret this in terms of a cross between Arabian and Liberian coffee, considering for the sake of simplicity the vigour of Liberian, (Lv), and the yielding character of the Arabian, (Ay). When these are crossed and the seeds sown we have hybrids, all of which, in practice, appear of the Liberian type, with the big leaves and berries, and usually with a six petalled flower. These hybrids are next selfed, and the seed thus obtained sown. Now we shall get three types, in accordance with Mendel's law, which may be represented by the formulae, (Lv) (Lv), (Lv) (Ay), and (Ay) (Ay), and these will be in the proportion of 3 to 1. The (Ay) is the recessive character, and if the (Ay) (Ay) type is selfed and the seed sown, all will come true, and we have got one type which we set out to produce, namely an Arabian with the increased vigour which is a well known feature of making such crosses. Should the mongrel (Lv) (Ay) be desired it can be reproduced by asexual means, namely by cuttings, which in the case of coffee can be made to grow by proper treatment, and choosing the right sort of wood at the right time of year.

The work which has been done on coffee hybrids in Southern India stopped at the production of the first cross, and this is where it failed. Seed of this was grown, but no precautions were taken to ensure its being self fertilised and all sorts of results have been obtained as was to be expected, among others the production of the (Ay) (Ay) type, which has undoubtedly happened at Chundrapore.

The first generation hybrid should, however, be enclosed in a mosquito net when it begins to flower, or better still a number of flowers should be selfed by hand to ensure in-breeding, and thus much time will be saved.

The case of coffee is complicated of course because each species of coffee contains many Mendelian pairs, but these all obey the Mendelian law separately and independently of one another and to get the type we desire patient breeding is necessary, selfing the succeeding generation and weeding out the undesirable types. When the desired type is finally isolated it will for ever breed true.

As Professor East says, "When several character pairs differentiate the two parent plants in a cross, all possible recombinations are formed, the

relative frequency with which the combinations occur being simply the algebraic product of as many of the simple ratios as there are character pairs. The importance of the Mendelian facts to the commercial plant breeder is great. In crossing plants differing in several simple characters that segregate after hybridization he may rest assured of two things. First, that with a sufficient number of progeny in the second hybrid generation, every possible re-combination of the characters present will be represented by at least one *pure* specimen. Second, that these pure specimens when selfed, or pollinated with their own pollen, will breed true. It should be remembered, however, that one may have to self a number of plants to get the combination desired with all characters pure, for if any dominant characters are concerned, their purity can be ascertained only by breeding for another generation. As an illustration we may take the snapdragon, *Antirrhinum*. There is a long series of colours that segregate. There is also a type called "the Delilah," where the tube of the corolla is uncoloured. Starting with this form in only one colour, the whole colour series of Delilah forms may be reproduced by crossing with the self coloured strains. Or, one may combine the dwarf habit of the growth of the dwarf Champion tomato, with any of the various colours and shapes now on the market which have the ordinary tall habit of growth."

"Recent accurately controlled investigations in hybridisation have shown that many apparently complex results yield to simple explanations by use of the Mendelian theory. For example two or more hereditary factors may be necessary for the production of an actual tangible character. If factors A and B must be present for its production, then a plant carrying only factor A and another carrying only factor B do not possess the character. But let the two plants be crossed and the character appears."

"For all practical purposes in plant breeding the mere fact of segregation is of greatest importance and the complexity of recent Mendelian interpretations need not bother us. Suffice it to say that most plant breeders have accepted the explanation that the recessive character is simply the lack or absence of the character in question, while the dominant character is its presence. This is simply a slightly different interpretation of the same facts and simplifies some of the more complex results of crossing."

The article concludes by showing how the theory of hybridisation in accordance with Mendel's law has been translated into practice to produce an improved type of Tobacco, called the Halladay, possessing the large number of leaves of the Cuban parent, combined with the stocky habit of growth and the large leaves of the Havana parent.

If these valuable commercial results can be obtained with tobacco they can be obtained with coffee also, and it is hoped to very shortly commence work on these lines on a plot of land in the Nilgiris, which the Government has been asked to place at the disposal of the Nilgiri Planters' Association for the purpose. Should the Government consent to do so, the experiments will be conducted by the Curator of the Government Gardens and myself. Coffee unfortunately takes a considerable time to come into bearing, so that several years must elapse before any definite results can be obtained, but nevertheless results are certain.

RUDOLPH D. ANSTEAD,

Planting Expert.

Notes and Comments by the Scientific Officer.

80. *Lack of Uniformity in the Soil.*—Speaking of the variation in the composition of the soil, even in the same field and at points quite close to one another, Hall and Russell, in a paper on the "Error of Experiment in Agricultural Field Trials," read before the British Association at the Sheffield meeting, 1910, said,—“Even on a level field where no obvious variation occurs analysis shows there are certain differences in different parts of the field. A sensitive, and at the same time simple, test is to ascertain the percentage of moisture in samples of soil collected to the same depth, 6 or 9 inches, and as nearly as can be at the same time. The differences commonly amount to 5, or in dry fields to 10, per cent. of the moisture present. Another factor greatly influenced by variations in the soil is the amount of nitrate present. This affords an even more sensitive index of variation, since it depends on all the conditions favoring plant growth, moisture, temperature, air supply, and food stuffs, these being necessary for the production of nitrate, and also on the amount of water washing through the soil, nitrates not being retained like ammonium salts. Here, also, differences are found of the order of 5 or 10 per cent. of the amount present on fields that appear to be uniform. These differences may be accentuated where there is a dip in the field.

“Variations in the field arise partly from natural and partly from artificial causes. So many agents come into play in soil formation that uniformity can hardly be expected. Further the purely artificial operations, such as tilling, cropping, manuring, and folding have a profound effect on the soil, persisting for some years. Frequently the treatment has not been uniform over the whole field. Drainage, whether artificial or natural, is rarely uniform; during a very wet winter it is not unusual to see places in the field where wheat has been affected by differences arising either from lines of good drainage or patches of bad drainage. In other seasons the differences still exist, though not to so marked an extent.”

81. *Improved Wheat.*—Cambridge University has recently been distributing, in some bulk, seed of the new wheats which have been produced at their Experimental Farm. These wheats have been produced by working along the lines of Mendel's Law and are of two kinds, the one being disease-resistant, and the other a heavy yielder. From the latter some enormous yields have been obtained on special experiment plots, averaging seven quarters an acre. They have now passed the experimental stage, and seed is being distributed that they may be grown and tried on an estate scale. Should they fulfil expectations, they will permanently add some ten shillings an acre to the farmers' receipts, and a progressive improvement may be expected.

If this is possible with wheat, why should not a similar thing be done with Coffee?

82. *Monstera deliciosa.*—A correspondent asks “if the consumption of the fruit *Tornelia fragrans*, sometimes called *Monstera deliciosa*, is in any way harmful to human beings.” This plant is a native of Mexico and belongs to the family *Aroideae*. The succulent fruits are edible and have a flavour resembling that of the pine apple. In 1905 they were on sale at the Covent Garden market, imported from Portugal.

RUDOLPH D. ANSTEAD,

Planting Expert.

DISTRICT PLANTERS' ASSOCIATIONS.**Wynaad Planters' Association.**

Proceedings of a General Meeting held at Meppadi Club on November 9th, 1910.

PRESENT.—Messrs. Ewart, Halliley, Howland, Mead, Powell, Trollope; Mr. J. E. Dixon, Visitor, and C. E. Abbott, Honorary Secretary.

Mr. Mead in the Chair.

1629. *Proceedings of Special Meeting and Ordinary Meeting held on October 12th* were confirmed.

1630. *Roads*.—Read letter from Honorary Secretary to District Board Engineer about closing Nilambur Road for repairs.

(A letter has been received from Mr. Blake since the Meeting, enclosing a copy of the notice issued by President closing a section of this Road 5 to "bamboo timber and other heavy traffic" from Meenchanda to Nadugani, miles 50 to 60.)

Read letter from Mr. Blake enclosing Assistant Engineer's report of Vellera Mulla Road. To stand over.

With reference to Road 35 B Sultan Battery to Noopoya estimates have been sanctioned to the bridges at miles 18/3, 20/3, and 24/3, and work will be started shortly. The ferro-concrete bridge at foot of Wright's Hill is now open for traffic.

1631. *Timber on Darkhast Land*.—Read proceedings of Collector of Malabar, October 14th, 1910, forwarded by Deputy Collector, Wynaad. He agrees with the Deputy Collector that in case of there being no bid for the timber the application would probably be refused.

1632. *Recruiting for Ceylon*.—Read reply from Assistant Labour Commissioner, Ceylon, to Secretary, U. P. A. S. I.

Read also Mr. Leahy's address to Central Travancore Planters' Association. Resolved that Mr. Mead as representative of this Association on the Labour Committee appointed by U. P. A. S. I. be asked to communicate with Mr. Martin and Mr. Leahy.

1633. *Mysore Government and Act I of 1903*.—Read U. P. A. S. I. circular 47/10 conveying the refusal of the Mysore Government to appoint anyone to attest labour contracts.

1634. *Non-service of Warrants*.—Read U. P. A. S. I. circulars 49/10 and 53/10. Recorded with satisfaction.

Read letter from Mr. Rowlandson, D. S. P., S. Malabar, asking for the name of the village in which Mr. West's Maistry lives (para. 1609) in order that he may take steps to ascertain why the warrant was not served. Mr. West to be asked to send this information.

1635. *Scientific Officer and North Mysore Association*.—Read Proceedings and Mr. Browne's speech to members. This meeting agrees with much of what Mr. Browne said as regards the necessity of having scientific advice for each product, and thinks that Proprietors should be canvassed so that the matter can be discussed at the next U. P. A. S. I. Meeting.

1636. *Trichur Exhibition*.—Read letter from Honorary Secretary, Malabar Coast Planters' Association. The Honorary Secretary to thank Mr. Gudgeon and to Members to support this exhibition.

1637. *Pepper Vine Disease*.—Read letter from Mr. Anstead. Honorary Secretary to communicate with those who are carrying out these experiments.

1638. *Coffee Cess*.—Read letter from Secretary, U. P. A. S. I., and Hony. Secretary's reply, which was approved. The Meeting hoped that with the information now before it Government will agree to the Cess being imposed.

1639. *Importation of Plants and Seeds*.—Read U. P. A. S. I. circular 48. The Association awaits further information.

1640. *Fugitive Offenders' Act*.—Read letter from Honorary Secretary to Collector.

1641. *Poodapardy Hotel*.—Read letter from Mr. J. B. Burnett about the insanitary state of this place. The Honorary Secretary to write strongly to Chungaren.

A vote of thanks to the Chair terminated the proceedings.

(Signed) A. H. MEAD, *Chairman*.

(„) C. E. ABBOTT, *Hon. Secretary*.

Shevaroy Planters' Association.

Proceedings of a Committee Meeting held at the Victoria Rooms, Yercaud, on 7th November, 1910.

PRESENT.—Messrs. C. G. Lechler, J. C. Large, C. Rahm, Revd. Rochet and Chas. Dickins (Honorary Secretary, and Chairman).

(1.) The Notice calling the meeting was taken as read.

(2.) *Cart Rates and Loads*.—The Committee having considered their question have come to the conclusion that the fairest way to determine this matter is to fix the rate from the centres of districts as given below by paying at Bushel Rates—that is to say—2 annas per bushel from Cauvery Peak and Vellalakadai Estates; 1 an. 8 pies from Balmadies; 1 an. 4 pies Cascades; Yercaud shandy 1 an. 1 pie; Varniah 1 an. 8 pies; Nagalur (Hope Villa) 1 anna 9 pies. Estates further afield than the centres given above or nearer the Railway Station should pay a fraction per Bushel more or less as the case may be. It is the opinion of the Committee that under class dry, anything below 36 lbs. should be considered dry parchment, anything over 36 lbs. wet parchment. The Committee earnestly desire that members of this Association should without fail adhere to these rates, which they think would be acceptable to cart owners.

In connection with the above the Committee also think it desirable to state that it considers a Commission of 3 pies per bushel paid to the supplier going with the consignment should include all outside charges such as portage.

(3.) *Resignation of Mr. B. Cayley*.—Read letter dated 11—9—10 from Mr. Cayley resigning the Committee. Resolved that the Honorary Secretary be requested to write and ask Mr. R. Gompertz if he will take up Mr. Cayley's place on the Committee.

(4.) *Experimental Plots*.—Messrs. J. C. Large and C. Dickins have consented to reserve blocks for experimental purposes. Resolved that Messrs. A. G. Nicholson and L. M. Hight be asked if they will do the same. Those Members who have given blocks will act as a Committee.

(5.) *With reference to Accounts*.—Read letter from Mr. G. Turner dated 30—9—10 suggesting certain alterations in the system of Accounts. Resolved that the letter be forwarded to Mr. Ormerod for his kind perusal and opinion.

(6.) *Trichur Exhibition*.—Read letter dated 18—10—10 from Hon. Secretary, Malabar Coast Planters' Association, with reference to the Exhibition. Resolved that the Hon. Secretary be requested to reply that the time allowed is insufficient for the preparations of Exhibits at the Trichur show.

(7.) *The Scientific Department*.—Read circular No. 51/10 dated 24 October from Secretary, U. P. A. S. I.

Resolved that this important subject be brought up for discussion at the General Meeting to be held in December.

(8.) *"The Anglo-Indiana" Magazine*.—Read and recorded letter dated 13—9—10 from Mr. H. J. A. Harvey, proprietor of the above paper.

(Signed) CH. DICKINS,

Hon. Secy., S. P. A.

VARIABILITY OF PLANTATION PARA

Commenting on a letter from a manufacturer having reference to the lack of uniformity in plantation Pará, the *India-Rubber Journal* quotes statements of a well-known London chemist, who recently visited America and has considerable experience in testing plantation Pará in addition to other grades. He writes:—"If this lack of uniformity is primarily due to the planter there is very little excuse for it, but on the whole I am satisfied that the trouble in this direction lies here and not in the East." He adds that he thinks the chief cause of variations in plantation rubber is the lack of care in coagulation and in curing generally. There is a considerable carelessness in regard to the use of acetic acid, and frequently much too much is employed; I have seen sheet quarter-inch and more thick which is very pretty to look at, but which, as a result of over-dosing with acetic acid, was perfectly rotten and could be torn like cardboard. . . . The plantation people will have to get to understand that they cannot use acetic acid in a haphazard way, and the sooner they get to understand this the better.

With regard to drying, there still appears to be a considerable divergence of opinion or lack of knowledge displayed. Some of the drying houses are at much too high a temperature. I am very strongly of opinion that every batch of rubber which comes from the East should be smoked, and I feel sure that if this were done there would be far fewer complaints of lack of uniformity than is the case, although the other factors to which I have referred must not be neglected. The main factor in strength is, of course, the physical condition of the rubber, that is, either the state of polymerisation or the condition of the colloidal aggregate. . . . It is fairly obvious that a rubber which is on a relatively low basis of polymerisation or colloidal aggregation must behave differently during vulcanization from a rubber which is on a higher plane. The end to aim at then, is to adopt methods of coagulation and curing which throughout tend to produce rubber of the highest state of aggregation. No doubt the age of the tree plays a considerable rôle in this regard, but if this is so and standard methods of coagulation were employed, it might be possible to grade rubber approximately according to the age of the trees, or at any rate place a rubber under five years to one class, rubber up to eight years in another class, and so on. At the same time, the manufacturer would have to be educated up to appreciating this method of grading, and as a preliminary to this extensive experimental data would have to be collected. I do not think that the resin content should vary considerably or that this is of much importance, provided it does not rise above, say, 5 per cent., except where this indicates deterioration, as is sometimes the case.

To sum up the whole matter, as the *India-Rubber Journal* observes, what is required is greater uniformity of method and concerted research and practical experimental work, conducted partly on the plantation and partly at home.

SELECTED CUTTINGS.**The Control of Scale Insects in the British West Indies
by Means of Fungoid Parasites.****PART I.****GENERAL ACCOUNT.***Introduction.**[Concluded.]***POSSIBLE RELATION BETWEEN HOST AND PARASITE.**

When looking for parasitic fungi, with the possible exception of the black fungus (*Myriangium Duriaci*), it must be remembered that the fructifications, by which alone they are made easily visible, cannot be expected to be present in any given locality at all times of the year. They come and go according to the stage in its life-history that the fungus has reached at the time. As an illustration of this, the following observations in Dominica during 1909 may be cited. The fructifications of the red-headed fungus (*Sphaerostilbe coccophila*) were observed at the Agricultural School in May, but had disappeared at the beginning of June; they did not re-appear until November. These facts should be considered in connection with the following observations made in Montserrat.

One field was visited by Mr. H. A. Ballou, the Entomologist to this Department, and by the author on March 9, 1910. The field had suffered from attack by the purple scale (*Mytilaspis citricola*) during the preceding twelve months, and had been put under Bengal beans which had been cut-lashed a month previously. The trees had recovered from the scale insect attack, but practically no red-headed fungus was observable, although it had been seen a month before in large quantities by two reliable observers. On the next field to leeward, however, fructifications of this fungus, both conidial and perithecial, were present in large numbers. The attack of the insects had reached this field somewhat later than the previous one, as the insects travelled with the wind, and consequently the fungus was still visible, as it also had started its life-cycle at a somewhat later date than in the first field. The presence of the perithecia, which probably constitutes the last stage in the life-history, would appear to indicate that the fungus was about to disappear from the second field also. Both of the instances just cited tend to show that the fungus has a definite life-period which must be influenced to some extent by the amount of food-supply available. It should also be borne in mind that the scale insects themselves have a definite life-period, though details with regard to this are at present wanting in the West Indies. It is probable that the season of greatest abundance of these insects falls between approximately the same dates of each year, and the same would also be true of the season of least abundance. The sequence of events would appear to be somewhat as follows. The spores of the fungus are blown on to a tree where numerous young scale insects are present; they germinate if the conditions are not too dry; the germ tubes penetrate the bodies of some of the young scales by growing in under the scale itself, and once established, the fungus spreads rapidly. After very vigorous vegetative growth, during which the only sign of the existence of the fungus is the number of dead insects present, the food-supply becomes exhausted, and the fungus produces fructifications and is then visible. Finally, the fructifications and most of the dead scales are washed off the tree by rain and disappear, leaving the tree clean with the exception of spores of the fungus caught in the bark, a small residue of dead scales that have not been removed, and a few healthy scales that have not been infected by the fungus.

If the scale insects reinfest the tree, either owing to the increase of the original survivors, or to infection from an outside source, the spores germinate again, or reinfection takes place from outside, and, as the scales become fairly numerous, the life-story of host and parasite is repeated. There are thus probably two periods when the fungus is not visible; one when it is making much vegetative growth, scale insects being numerous, the other when it has disappeared owing to the absence of a sufficient food-supply; under the latter circumstance, very little fungus is present at all on the tree. How far the life-period of the fungus is affected by external conditions remains to be seen; probably moisture has an effect on the rate of growth during the period of vegetative activity. The relationship of the fungus life-period to that of the host also requires investigation, but for this, the life-period of the scale insects, that is the time occupied from one brood to the next, must first be carefully determined. In any case, it seems that the food-supply, as afforded by the insects, cannot be expected to be entirely continuous. Green, in his book on the *Coccidae of Ceylon*, remarks on the periodicity of the appearance of the green shield scale (*Lecanium viride*), and says that this is apparently connected with weather conditions, extremes of rain or of drought being alike unfavourable. Moreover, when the numbers of live scales are decreasing, the shield scale fungus is always found to be present and may kill as many as 90 per cent. of these insects.

The above suggestions are put forward in a purely tentative manner, as the evidence on which they are based is insufficient to permit of any definite conclusions. They may, however, be useful as suggesting lines of work for future investigations. The matter is one of some importance locally, as fructifications are often wanted for purposes of spreading the fungus, and, as has been noted, they cannot always be found. When this is due to the greater vegetative activity of the fungus, it might be spread with equal effect by using branches of trees on which fructifications of the fungus had formerly been observed, but from which they had subsequently disappeared. The mycelium of the fungus would then be present. But when the absence of the fructifications is due to the disappearance of the fungus owing to want of food, such material would be nearly useless for infection purposes. In this case the scale insects themselves would probably be far from numerous, and those present would be mainly dead, unless the tree had been reinfested with insects while the fungus had not had time to obtain a hold.

EFFECTS OF CLIMATE.

The general climate factors which may have an influence on the effectiveness of these fungi are three; namely, temperature, wind and moisture.

Temperature.—The four species of fungi known in the West Indies all belong naturally to the tropical or sub-tropical regions, and consequently cannot be expected to flourish in colder parts of the world. This expectation has been fully borne out in the case of the redheaded fungus (*Sphaerosilbe coccophila*). Several attempts have been made to introduce it into the more northern of the United States and into Canada, but it has never been sufficiently vigorous under the colder conditions to be of any economic importance in controlling insect pests.

Wind.—Parasitic fungi are never so effective in windy situations as in sheltered ones. In fact, they are rarely found in places where they are exposed to any severe winds. This is probably mainly due to the drying effects of the wind. The shield scale fungus (*Cephalosporium lecanii*) has been found by Mrs. Patterson in St. Vincent attacking the mango shield scale (*Lecanium mangiferae*), which was growing on a tree in a very windy

place, but the fungus was not of luxuriant growth and did not appear to be nearly as effective as it is in calmer places.

Moisture.—This is the most important factor influencing the growth of these fungi—a fact which is clearly illustrated by the relative effectiveness of the fungi in the different islands. The parasites are very plentiful in Dominica, where the rainfall varies on some estates from 100 to 150 inches in a year, and in St. Lucia, where there is almost as heavy a rainfall, at any rate in some districts. As already stated, since the year 1903, there has not been a single outbreak of scale insects of any really serious dimensions in Dominica. Dr. E. W. Berger remarks that under natural conditions, fungi were able to control the attacks of white fly once every three years. It would seem, however, that in Dominica, the scale insects are kept in check much more effectively than this. On the other hand, in Antigua and Barbados, and possibly even St. Vincent, they are not nearly as effective. In the former cases, this is probably owing to drought; in the latter, the causes would appear to be more complicated, as the island is not excessively deficient in rainfall. In fact, at one time citrus trees could be grown there with success, though now, more especially since the eruption in 1902, they are persistently destroyed by the attacks of scale insects. The actual reasons for this require further investigation, as at least three species of parasitic fungi are known to be present on scale insects in the island.

A good instance of the effect of drought is furnished by the outbreak of scale insects in Montserrat and Dominica already referred to, which took place in 1903. It was found that while both the white and purple scales (*Chionaspis citri* and *Mytilaspis citricola*) were present in both islands, the greater part of the damage in Montserrat was due to the white scale (*Chionaspis citri*), while in Dominica, which even in a dry season is damper, the purple scale (*Mytilaspis citricola*) was more serious. It has since been found that, under normal conditions, the black fungus (*Myriangium Duriaei*) acts as an efficient check on the white scale in both islands, while observations show that in Montserrat, this scale never becomes serious unless the tree is suffering from drought. This would appear to indicate that, in 1903, the drought in Montserrat was so severe as to check the black fungus, and thus enable the white scale to become numerous. In Dominica, the drought was not so severe as completely to check this fungus, though the more delicate red- and white-headed fungus parasites of the purple scale (*Sphaerostilbe coccophilla* and *Ophionectria coccicola*) were rendered ineffective. These observations would appear, then, to bring out two points. Firstly, the effect of drought on the fungi, as already indicated; and secondly, the fact that the black fungus is hardier in this respect than the other species. The second of these conclusions, however, must be tested by future observations before it can be definitely accepted, as there are no records of the relative abundance of the fungus in these two islands during the year under consideration.

The outbreak of scale insects in Dominica in 1903 presents some further features of interest in connection with the effect of external conditions on the parasites of these insects. In 1902, the season was dry, the yield of fruit from the lime trees, which were those principally attacked, was very heavy, and the island was covered with dust from the eruption of Mont Pelée. During the ensuing dry season at the beginning of 1903, the trees were badly attacked by scale insects, which, however, rapidly disappeared again in the subsequent normal years 1904 and 1905. It is of course clear that the trees had been weakened by the heavy crops, combined with the general unfavourable conditions in 1902; but it is also fairly certain that the spread of the

scale insects was largely due either to the absence of the parasites by which they had formerly been controlled, or at any rate to the check that the parasites had received through want of moisture, together with the effects of volcanic ash, in 1902, and the succeeding dry season in 1903.

The idea that the reduction of the parasites was the factor mainly responsible for the outbreak of this scale insect attack is supported by the gradual return to the normal conditions which occurred during the years 1904 and 1905, and by the absence of any serious subsequent attacks. Moreover, the outbreaks cannot be explained as due to the introduction of new species of scale insects, as the scales concerned, mainly the purple and the white scales (*Mytilaspis citricola* and *Chinaspis citri*) were both reported by Professor Riley as being present in the island in 1894. It should also be mentioned, that on some estates extensive spraying operations were carried on chiefly with kerosene emulsion and rosin compound. The trees on such estates recovered much more quickly than those which were not treated, and it seems likely that, in certain cases at any rate, the complete loss of many trees was prevented. It should be noted, further, that the solutions used were those least likely to have any harmful effect on parasitic fungi of the scales, and that they probably were of actual assistance by checking those insects sufficiently, to enable the parasites to regain their supremacy.

At the effect of volcanic ash has been mentioned, it may be worthy of record, that there seems to be a fairly general belief among planters throughout the islands, to the effect that black blight, and therefore probably scale insects, have been more common since the big eruptions in Martinique and St. Vincent in 1902. This may possibly be due to the effect of the ash on the parasites of the scales. While it might be so in the case of the delicate insect parasites, it is not an easy matter to account for the effect on the fungi. In any case, this would seem to be an illustration of the great increase in numbers of an insect, owing to the fact that the natural control exerted by its parasites had been removed, or seriously checked. The scale insects may themselves have been greatly reduced in numbers, but the much larger destruction of the more fragile parasites provided an opportunity for their almost unrestrained natural increase. As there is little doubt that the survival of the parasites occurred to some extent, it is fairly certain that they will ultimately reach such numbers as to be capable of exerting the same control as existed before the volcanic eruptions.

THE EFFECT OF SCALE INSECT PARASITES ON THE PRESENCE OF BLACK BLIGHT.

As a result of enquiries made in all the islands, it has been known fairly definitely, that black blight fungi (*Capnodium* and *Meliola* sp.), but especially *Capnodium mangiferae*, are never found on trees where they are not in some way or other associated with the presence of one or more species of scale insects. The commonest insects in this connection are the green scale (*Iccanium viridi*), and the mango shield scale (*L. mangiferae*). Consequently, the reduction of the scale insects by means of their parasites should be attended by a lessening of the amount of black blight, and where a tree is successfully cleared of insects, the blight should also disappear. Experiments with a view to controlling black blight in this way have been suggested for trial in Grenada—an island in which there is a very large amount of this disease. On the other hand, the author has seen a species of black blight fungus on a palm at the Botanic Station at St. Lucia; distributed in such a way under the inflorescences as to lead to the

suspicion that the fungus was living on the nectar falling upon the leaves from the flowers. This idea was supported by the fact that there were very few scale insects present on the leaves. Mr. Moore, the Agricultural Superintendent in St. Lucia, who first observed this, suggested that, possibly, the same thing was true in the case of the mango, and if so, removal of the scale insects would not have the effect of removing the blight until after the flowering season in the case of the trees mentioned. These points, however, all require further investigation, and at any rate, the question of the prevention of black blight is somewhat of a side issue.

COMPARISON OF ARTIFICIAL AND NATURAL METHODS OF CONTROLLING SCALE INSECTS.

Before proceeding to the next division of the subject, it may be advisable to add that Hume, in his book on *Citrus Fruits and their Culture*, remarks that the effect of attempting to combine the artificial control of scale insects (by means of various sprays and by fumigation) with the natural control (by means of parasites), only results in producing the bad effects of both methods; and it seems at present that the natural means of control is undoubtedly the one most suited to the conditions in the majority of the West Indian Islands. The reasons for this are of two kinds. In the first place, the natural method of control is not so expensive to institute as the artificial method, involving as it does no outlay on spraying pumps and materials, and but comparatively little labour. Further, it does not necessitate periodically recurring outlays for the repetition of the treatment, since, once established, the only cost involved, that of reintroducing the parasites where this is necessary by means of one of the methods already described, and of replanting Bengal beans (*Mucuna pruriens*, var.) in places where their use is advisable, is of very minor importance when compared with the expense incurred in extensive spraying operations, which may have to be repeated two or three times in a year. In the case of limes, moreover, the value of the crop is small compared with that of the more specialized forms of citrus fruits such as oranges, so that it does not permit expensive spraying operations to be conducted with profit. Cost is an even more important factor in the case of field fumigation on account of the heavy outlay involved in buying tents. Secondly, on many estates in the West Indies, the nature of the ground, its roughness and slope, difficulties of obtaining water, of procuring sufficiently skilled labour, and similar factors render spraying on a large scale impossible from a practical point of view. These same factors, more especially that of obtaining sufficiently skilled labour, also prevent, to an even greater extent, the use of fumigation.

Experience in Montserrat, where the scale insects are always liable to cause serious trouble, has shown that with a little assistance, more especially in dry seasons, the natural enemies are just able to keep the insects in check. Recent investigations by the Entomologist of the Department, Mr. H. A. Ballou, and by the author have shown that numerous parasitic species of both insects and fungi are present, and possibly the control effect is due more to the number of species than to the number of individuals of those species. Mr. Driver and his colleagues are of the opinion that spraying methods are not of much use; and moreover, trees examined showed clearly, that where sprays had been employed, the natural enemies of the scales had received a decided check. This was well illustrated in one particular case. In a certain field a belt of trees had been sprayed about twelve months before they were examined, while the remainder were left unsprayed. On the unsprayed portion, the red-headed fungus (*Sphaerostilbe coccophila*) was abundant on the white and purple scales (*Chionaspis citri* and *Myti-*

lasps citricola), but on the sprayed portion only a few fructifications were found. This observation certainly supports the statement by Hume referred to above.

The following is a short abstract of a letter written by Mr. F. Foster Huggins to the *St. Vincent Sentry* of April 8, 1910, that contains some points of interest in this connection :—

The frequent appearance of black blight in St. Vincent is associated with scale insects which infest either the plant which exhibit the blight, or overhanging trees. The author found that individual effort to control the scales by artificial means was useless, as, even when the trees were cleared, they rapidly became reinfested from surrounding vegetation on which the scales abounded. He lost hundreds of grown orange and other trees owing to the prevalence of the scales, but recently, some of the remaining trees have shown signs of improvement. This has been due to the presence of a small red fungus on the scales (undoubtedly *Sphaerostilbe coccophila*), which attacked the mussel scale (*Mytilaspis citricola*), the white scale (*Chionaspis citri*), and the red scale (*Aspidiotus* sp.), though the star scale (*Vinsonia stellifera*) was unaffected. Experiments in transferring the fungus from tree to tree were successful whenever the weather was wet, and the author now has hopes, not only of keeping his trees alive, but of getting them into a good condition for cropping. (The scientific names in brackets have been inserted by us.—ED., W. I. B.)

On the other hand, under exceptional circumstances, such as a serious epidemic of scale insects in a dry season, it is probable that the judicious use of insecticides such as whale-oil soap compound, kerosene emulsion, or rosin compound would prove of the utmost value. Not only would such spraying mixtures prevent the immediate inflicting of excessive damage on the trees, but they would, as already pointed out, enable the natural enemies to regain their position in a shorter time. Dr. Berger, in a short article 'Citrus scales and white fly' contained in the *Florida Agriculturist* for March, 1910, supports this view but insists on the avoidance for this purpose of any insecticides containing sulphur or possessing any fungicidal ingredients.

When considering this point it must, however, be borne in mind that, in addition to the four species of fungi, there are also several species of insects which live on scale insects. Among these is a small hymenopterous species which lives as an internal parasite on the purple scale (*Mytilaspis citricola*). Such delicate insects, and especially that just referred to, would almost certainly be destroyed by insecticides, and the proportion of them thus killed would be even greater than that of their hosts. Thus it would probably be found, after employing insecticides, that parasitism by these insects would not be as common as before. As a result of these arguments it will be evident that, even in serious cases, insecticides should only be used as a last resource, once it has been determined that the natural means of control is that most suited to ordinary conditions.

[In Part II, "Distribution of the Fungi among the Islands," the writer makes an attempt to give some account of the distribution of the different species of fungi, and of the different scale insects which they attack, throughout the islands of the Lesser Antilles.]

[Part III contains a technical "Description of the four species of Fungi."]

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The "Planting Member."

In last issue there was a blunder made in respect to the Hon. Mr. J. G. Hamilton's address in Madras next week. The "Madras Club" was meant, but, by a slip of the pen, the "Mysore Club" was mentioned.

Mr. Hamilton arrived in Bangalore late last night and leaves for Madras to-morrow morning.

The S. I. P. B. F.

Mr. John C. Sanderson, the Association's London representative, was asked to undertake the Home Agency of the Benevolent Fund. Being of opinion that a firm of merchants would be in a position to do fuller justice to the matter, Mr. Sanderson very kindly mentioned it to Messrs. T. H. Allan & Co., and they have been good enough to accept the responsibility of acting as Home Agents. Not only this, but they have promised to personally interview some of the leading Brokers in London and, when they have a few of the most influential names on their list, to either write to, or call upon, all the other firms likely to be interested. In fact they state that they will have pleasure in doing their best to collect a substantial sum in subscriptions or donations.

The Ceylon Tea Duty.

Reuter wired on the 18th instant that, in the House of Commons, Sir J. D. Rees asked whether Lord Crewe would advise the Government of India to obtain the abolition of the Ceylon Import Duty on Tea, in view of disabilities and disadvantages caused to South Indian planters by its retention.

Mr. Montague replied, "No." The Ceylon Government regard the duty as essential to the preservation of the reputation of Ceylon teas. Lord Crewe and the Government of India are, therefore, not prepared to press the matter.

Sir J. D. Rees, it may be remarked, had received no "brief" from this Association. In accordance with the resolution passed at the Annual Meeting 1910, preparations had been made to submit "a case" to him, but they were completed only a few days ago, and by then it was evident that parliamentary affairs in England were in a state of flux. A reference has now been made to the Council of the U. P. A. S. I. as to the advisability of deferring matters still more. In the early days of a new Government subjects such as this can scarcely be expected to receive the careful consideration they merit. To have brought it up on the very eve of a dissolution would probably have led to no better results.

Coffee Curing.

In connection with the proposed study of coffee-curing problems, the Scientific Officer is collecting as much information as is available. Portions of this will be published from time to time, but Mr. Anstead purposes reserving comment until he has had an opportunity of visiting one of the curing works and seeing the operations there.

Reference is invited to Sc. O's note No. 83 in the present issue, which marks the first step in the direction indicated above.

Apropos of this subject attention may be drawn to some remarks of Mr. A. S. Booth (a director of Messrs. Appleton, Machin & Smiles, Ltd.) in the course of a lecture on "Coffee" delivered last month to the students of the technical education class for grocers at the Battersea Polytechnic.

"In Buying Coffee for Flavour in this country," he said, "we looked especially for what was called the full acid flavour, and the Costa Rica coffees, on the average, had more acidity than coffees from any other district. The colour of the raw berry was undoubtedly a guide in buying, but it was not an infallible guide, as the colour might be due to moisture left in the berry that ought to have been excluded. If, however, a coffee had been thoroughly dried and it still retained its colour, that was an indication of high quality. The size of the berry was a guide to the value of coffee, as the bolder berry fetched a higher price than the smaller, and in the bolder berry they were very much less likely to get any withered berries. If, however, they got a second-sized coffee that was absolutely free from withered berries, they would get as good a result as from the larger sizes."

"As to the best sorts to be used, it was well to keep an open mind, for during the 40 years he had been engaged in the trade he had come to the conclusion that it was never safe to lay down hard and fast lines. Costa Rica coffee gave the best acidity, and that had become the main coffee now used in this country."

Hybridisation of Coffee.

Seed of *Coffea robusta* is under order from Java.

For seed of some other varieties that will probably be useful for hybridisation purposes quotations have been obtained from Europe. These vary considerably according to the magnitude of orders, and exact quotations cannot, therefore, be given; but it is hoped that, if planters will send their orders in to be lumped together, cost will work out within the following rates:—

Stenophylla	...	Rs.30 per 1,000 seeds.
Congensis	...	Rs. 6 per 100 seeds.

The latter of these is the new variety—"Coffea congensis var. *chaloti*," which is described as absolutely resistant to *Hemileia vastatrix*.

The Scientific Officer attaches great importance to this new variety for purposes of hybridisation experiments on a small scale.

He also advocates experiments with Maragogipe, seed of which variety, grown in India, can also be obtained through this office at about Rs.20 per half-bushel.

Police in Mysore Planting Districts.

A letter, dated November 19, 1910, from the Secretary to the Government of H. H. the Maharaja of Mysore, General and Revenue Departments, to the Secretary, U. P. A. S. I., reads as follows:—

"With reference to your letter dated the 26th August 1910 regarding

the increase of Police Force in the Districts in which labour is largely recruited for plantation work, I am directed to state that the District Magistrate and the Inspector-General of Police in Mysore have been requested to devote special attention to the execution of warrants referred to in the letter under reply."

"The Gwalior Commercial Journal."

The Gwalior Darbar has commenced issuing a journal intended "to stimulate the many industries that have been introduced by publishing all matters that interest them, and edify the people to the end that they increase their commercial relations with the outside public." With this admirable object no one will find fault, and the compiler of the new Journal, which has already made its first appearance, remarks that it is hoped to be able to incorporate the views of experienced men on agricultural matters and the results of agricultural experiments all over India and obtain and publish useful information on local economic products and industries, the mineral resources of the State, and the trades of the different marts. A copy is to be published in the Hindi language, and "it is intended that the Journal should contain matter interesting to the Public at large so that its circulation be not limited to those who are interested in the Gwalior State alone."

A copy of the first number has been sent to this office, and the chief object of the present remarks is to acknowledge its receipt and express warm appreciation of the contents and arrangement of the new publication. Quite appropriately the opening article dwells upon the very great difficulty, in India, of disseminating knowledge among the rural community. It is remarked:—"He would indeed be a benefactor to the country who could invent some new and effective method by which knowledge could be communicated to the rustic farmer. We hear the shout:—the Patwari of course! Yes we know of nothing else just now but are quite certain that this medium is not sufficient. Poor Patwari, with his pen behind his ear and his bundle of registers under his arm endeavouring to finish the *partial* of a village of 3,000 acres by a certain date and broken hearted at being unable to reconcile a difference of 3 kachwansis, the error being somewhere among 6,000 items, has no leisure for such work which is greatly out of his line. Then again he is a professed liar, we do not blame him for this, it is inevitable where he has 3 masters to serve with conflicting interests:—a government, a landowner and a tenantry, and all that he says has to be received with reservation. A story is current among villagers, that a man who had practised great austerities was permitted to enter and view Paradise. In his ramblings he noticed a wolf there, and surprised at the beatitude of such a sinful creature asked one of the residents what it could have done to have expiated its many crimes, and the man replied that it had eaten a Patwarie's child."

In another paper light is thrown on the ways of "The Agricultural Financier." The writer concludes with the cheerful assertion that "when the landowner is also the banker and threatens coercion there is nothing for it but to abscond." "Hybridization of Cereals" and "Cattle Breeding" are discussed in the spirit of modern scientific progress. There is a long paper on "Cottage Industries," and the outside public (non-agricultural) will probably be greatly interested in an article "On the Sanskrit Origin of the Forms of European Numerals."

The Gwalior Darbar deserves to be congratulated very heartily on "a new departure" that is rich in promise of a very useful future.

Scientific Officer's Papers.**XLVIII.—THE PART PLAYED BY MICRO-ORGANISMS IN THE SOIL.**

The soil contains in its interior an immense flora consisting of minute plants which it requires the use of the highest powers of the microscope to detect, and this micro-flora has a profound effect upon the plants growing on the surface. Each year the importance of soil bacteria, and other organisms, has been more and more realised, and the whole aspect of manuring and cultivation in its relation to these microscopic plants has changed, and in future years is likely to change still more.

The subject was very much to the fore in the Agricultural Section of the British Association Meeting held this year at Sheffield. Mr. Golding and others, says *Nature* "dealt with the whole question of nitrogen fixation in the root nodules of leguminous plants. This fixation is brought about by bacteria which invade the root hair as infection threads, pass through a rod shaped stage, and finally assume the bacteroid Y form. Mr. Golding is steadily overcoming the difficulties of working with the organism in artificial media, and is succeeding in making it pass through the changes that it undergoes in the plant. During the period of active Nitrogen assimilation an alkaline substance is formed; after a time, if the products are not removed, assimilation stops, the alkali disappears and the medium becomes acid. Dr. Russell pointed out that this change from alkali to acid reaction indicated that the organisms were now utilising the nitrogenous base already formed, and therefore setting the acid free, a change known to go on in other cases."

The latest discovery is that other organisms in the soil besides the bacteria play an important part in soil fertility, and in the *Planters' Chronicle*, Vol. V/1, pp. 114 and 128, under the title of "The Fertilising Influence of Sunlight," some correspondence which appeared in *Nature* bearing upon this subject was reproduced.

At the British Association Meeting a paper was read by Messrs. Russell and Hutchinson on 'The part played by Micro-organisms other than Bacteria in determining Soil Fertility.'

This paper further elucidates the matter, and though no practical means of controlling the type of micro-organisms present in a cultivated soil have as yet been arrived at, a new line of research in this direction is indicated, and it may be that in the future, instead of applying manures to our soils, we shall apply antiseptics, and thus by favouring the growth of the beneficial bacteria, increase the Nitrogen content of the soil and our crops. The paper referred to reads as follows:—

"Of the various food-stuffs supplied by the soil to the plant the nitrogenous compounds, ammonia and nitrates, are among the most important; other things being equal the greater their amount in the soil the greater is the amount of plant growth. These compounds are not part of the original mineral constituents of the soil, but are formed, by bacterial action, from the organic matter invariably present, organic matter that has arisen from previous generations of plants, from bodies of animals, or from organic manures that have been added. The soil bacteria are thus producers of plant food; the more actively they work the more fertile is the soil, while anything that limits their activity also limits the fertility of the soil.

"It thus becomes of interest to examine the action of antiseptics on the soil. An antiseptic might be expected to stop the changes going on, and it actually does so while it remains in the soil. As soon as it is removed, however, the surviving spores germinate and give rise to a new crop of orga-

nisms. But a remarkable phenomenon is now observed: the new flora becomes far more numerous, and effects a much greater amount of decomposition than ever the old one did. Thus, when a soil was treated with toluene the number of organisms active and as spores was reduced from 6'2 to 2'6 millions per grm.; but when the soil was spread out for a few days so that the toluene could evaporate, then moistened and left, the number of organisms rapidly rose to 40 millions, and there was a corresponding increase in the amount of decomposition effected. Heating for two hours to 98, a temperature insufficient to kill spores, led to the same result.

"Pot experiments showed that the productiveness of the soil is notably increased by either method of treatment.

"The first explanation suggested of these phenomena was that the spores had somehow been stimulated by the partial sterilisation, so that the new organisms were more virulent and efficient. This, however, was found not to be the case. Pure cultures of particular organisms—*B. mycoides*, *α Streptothrix*, and others obtained from a tolued soil turned out to be less virulent than from the original untreated soil. Additions of small quantities of tolued soil to untreated soil did not lead to any great increase in bacterial activity, as it should if more virulent races were being introduced.

"On the contrary, the evidence all shows that the organisms are actually weakened by partial sterilisation; when the original organisms are re-introduced by means of small inoculations of untreated soil into tolued soil there is a marked increase in the number of bacteria and in the work they do.

"This observation, indeed, puts out of court all purely bacteriological explanations, as it shows that the original flora as such is more efficient than the new flora. Other experiments led to the same conclusion. We can neither assume a stimulated flora nor a flora made more effective through a change of type: we can only suppose that the new organisms effect more decomposition by reason of their greater number.

"The problem is thus narrowed down to finding out what factor in the untreated soil is keeping down the bacterial population so that it does not rise above 10 or 16 millions, while in the tolued soil it runs up to 40 millions or more. The experiments already mentioned sufficiently prove that the factor is not bacterial. Nor is it a soluble toxin decomposed by toluene or chloroform; addition of an aqueous extract of the untreated soil to the tolued soil led to no depression, but, on the contrary, to an increase in the bacterial activity, due, as we found, to the introduction of some of the unweakened bacteria. Other chemical hypotheses also fell to the ground when we found that the injurious factor is capable of growth. Thus, in the experiments summarised the addition of untreated to tolued soil leads at first to an increase in the number of bacteria. After forty days, however, the numbers begin to fall, and with greater rapidity as the proportion of untreated soil is increased; where 5 per cent. was added the numbers fall from 60 to 26 millions, whilst when 20 per cent. was added they drop from 45 to 6 millions.

"We are therefore compelled to suppose that the factor is biological. Our results can be explained only on the assumption that there exist in ordinary untreated soil organisms keeping the bacteria in check. The organisms are not bacteria, and differ from them in at least three ways:—(1) They are not washed out from the soil to any extent, since the aqueous extract of the soil shows no deleterious effects; (2) they increase less rapidly than bacteria, as shown by the length of time that elapses before the inhibiting effect sets in; (3) they are larger and less numerous than bacteria, since the

small inoculation of untreated soil, 0.5 per cent. or less, does not invariably show the effect produced by a larger one. These are also the properties of protozoa, and we therefore looked for this class of organisms by adding soil to sterile hay infusion or to hay infusion-agar plates.

"From the ordinary untreated soil some two dozen kinds of protozoa were obtained, including colpoda, amoebae, monads, and others, which we found were capable of destroying bacteria in culture solution. From the tolued soil no colpoda or amoebae could be found, and only a few monads. Heated soil did not even contain monads.

"Any process that kills these large organisms leads to an increase in bacterial numbers and activity and in soil productiveness. Heating to a temperature of 50° C. for an hour is effective, whilst 40° C. is not. Drying for ten days at 40° C. is effective, but for twenty-four hours is not. So with regard to antiseptics; ether, benzene, carbon disulphide, and petrol all act, but sodium sulphite and others do not.

"Exposure for some days in a vacuum is also effective. In all the experiments so far tried the parallelism is complete; where hay infusion cultures show that the protozoa are killed bacterial counts show that the numbers of bacteria have gone up, chemical analysis show that the ammonia and nitrates have increased, and pot experiments show that the productiveness of the soil has gone up. Where, on the other hand, the protozoa have not been killed there has been no notable increase in any of these directions.

"Again; conditions known to favour protozoa, the presence of much moisture and soluble organic matter have a marked detrimental effect on the bacterial flora. The "wearing out" of greenhouse soils and the deterioration of soils on sewage treated farms are cases in point; investigations now in progress show that marked improvement sets in when such soils are heated, or treated with toluene.

"The indirect evidence that protozoa in the soil injuriously affect the bacteria is thus fairly complete, but direct evidence has not yet been satisfactorily obtained. The experimental difficulties of studying so opaque a substance as soil under the microscope and watching the movements of the micro-organisms have not yet been surmounted. Nor has it proved possible to grow the protozoa from a hay infusion culture in a tolued soil. These manipulative difficulties may in time be overcome; in the meantime we have only the indirect evidence.

"It may be of interest to summarise the properties which the offending organism seems to possess. (1) It is larger than bacteria; (2) it grows only slowly compared with bacteria; (3) it is not readily detached from the soil by shaking with water, it may, indeed, very well be a protoplasmic film round the soil particles; (4) it is killed at 48° C. or thereabouts, and also by prolonged drying; (5) it may possibly arise from monads.

"From the practical point of view experiments are in hand to discover some cheap and effective method of treating soils so that the injurious factor can be removed. Numerous pot experiments have demonstrated the possibility of obtaining crop increases varying from 20 to 100 per cent by treatment of the soil with a little toluene, or by heat, but a number of mechanical and other difficulties have to be overcome before such methods could be applied to field practice."

RUDOLPH D. ANSTEAD,
Planting Expert.

Notes and Comments by the Scientific Officer.

83. *Quality of Coffee and Liquoring.*—A correspondent has very kindly sent me the following notes on this subject made by Mr. Farrar, the representative of a large home firm of coffee buyers, when he was on a visit to Coorg some years ago. He agrees with Dr. Lehmann that weight spells quality practically always.

"When a sample runs 90 roasted beans to the half ounce it is generally good. The home trade is all done by liquor and it makes very little difference what the appearance of Coffee is. A good looking sample often liquors well, but not necessarily so. Foxiness is not always a bar to good liquoring quality.

"When testing roasted coffee an infusion should be made in china or enamelled pots, by using half an ounce of powder to half a pint of boiling water. This infusion is poured into cups and tasted as soon as cool enough, and the tasting is continued until it is nearly cold. It is when nearly cold that the best flavour is obtained.

"Pea berry has a better flavour than other sizes, probably because the nourishment and body of what was prepared by nature for two beans has gone into one.

"There is very little difference between A, B, and C, and sometimes B and C liquor better than A."

Mr. Farrar considers, "that somewhere, somehow, in cultivation lies the difference between quality and want of quality. It may be more sunshine, more, or different kinds of manure." He "cannot tell, but thinks it probable that the discovery, when made, will be a simple one."

The following are the characteristics of Indian Coffees as given by Mr. Farrar :—

Nilgiris yield 'guts,' *i.e.*, full bodied flavour, bottom, and strength.

Coorgs yield delicacy of flavour combined with strength.

Mysore yield pungency.

84. *Ant Extermination.*—A correspondent asks how to get rid of "black ants which establish themselves in burrows at the foot of fruit and rubber trees, exposing the roots, and, in some cases, causing the collapse of the tree during high winds."

To extirpate ants attention and perseverance are needed, especially the latter, and it is necessary to find the nest if possible and deal with it. The following remedies are good :—

(a.) Air slaked lime plentifully dusted in dry weather round the roots of trees and in the burrows causes the ants to vacate their position.

(b.) A bait of a mixture of one part Calomel to 10 parts of finely powdered white sugar, laid in little heaps about the runs, attracts the ants, which eat it and are poisoned.

(c.) Kerosene oil mixed with six times its bulk of soapy water poured into the nests and burrows every few days soon drives out the ants.

(d.) A strong solution of Sulphate of Iron will also kill ants and it is said to be beneficial to ornamental shrubs and fruit trees.

Ants are always difficult to exterminate, and persistency is required with all these remedies. It is of little use to destroy the workers only, the nest must be got at and the queens killed to be completely successful.

RUDOLPH D. ANSTEAD,

Planting Expert.

INDIAN TEA ASSOCIATION, CALCUTTA.

Extracts from Abstract of Proceedings of a Meeting of the General Committee held on November 8th, 1910.

*Correspondence with the Indian Tea Association, (London).—*Letters of 14th and 21st October from the Secretary, Indian Tea Association, London, which had been previously circulated were ordered to be recorded.

Assortment of Tea at the Factories.—With the letter of 21st October there was forwarded a copy of a letter dated 19th September signed by a number of firms of London Tea Buyers drawing attention to the drawback in connection with the cutting of teas at the factories. This practice, it was stated, detrimentally affects both the appearance and quality of the leaf grades, more particularly the finer qualities. It was also quite unnecessary as the London trade possessed its own machinery for all blending purposes. The price of the majority of good and fine Pekoe Tea, it was asserted, had undoubtedly suffered in consequence of these having been rendered unsuitable for the higher class blends of both the Home and Foreign trade.

The General Committee were asked to furnish copies of the letter to the Calcutta Agency Houses and also to the Association Branches. After fully considering the matter the General Committee thought that further publicity than had already been given to it was hardly required, the matter appearing to be one entirely for individual concerns to decide for themselves. Indeed, many sellers in Calcutta looked upon the proposal with some suspicion. The General Committee were rather inclined to agree with the following statement in a recent trade report of a well-known and important firm of tea buyers in London as more accurately indicating the course which it would be expedient for tea proprietors to follow :—

“Gardens which are at present milling and carefully cleaning and grading into blending sorts should not be persuaded to change their policy without first thoroughly satisfying themselves that the average price of their crop will be raised and not the reverse. To those gardens making good useful liquoring tea, the blender is more and more becoming all-important and the blender pays particular attention to clean even-leaf and semi-leaf sorts which will go straight into his blends. The matter of ‘straight’ tea is very important; a blend made entirely of teas which require milling would be ugly and full of dust.”

It was decided to advise the London Association Committee to the foregoing effect.

Prevention of Introduction into India of Insect Pests and Fungoid Diseases.—The General Committee had before them a letter dated 5th November 1910 from the Officiating Director of Agriculture, Bengal, forwarding a copy of correspondence on this subject. From this it appeared that the Government of India were of opinion that some measure of control is desirable to protect the staple agricultural products of India from danger arising from the importation of insect pests and fungoid diseases with foreign plants. The Government of India requested the opinion of the Government of Bengal as to the advisability of issuing, under section 19 of the Sea Customs Act, 1878, a notification on the lines of a schedule of dangerous plants drawn up by the Director of the Agricultural Research Institute, Pusa, accompanying the papers. The opinion of the Association on the subject was requested.

After discussion it was decided to refer the matter to the Association's Chief Scientific Officer, Dr. G. D. Hope, for an expression of his views.

COFFEE.**Coffee Industry of Spanish America.**

COMPILED FROM ANNUAL NUMBER (PARTS I AND II) BULLETIN OF
INTERNATIONAL BUREAU OF AMERICAN REPUBLICS,
JULY AND AUGUST, 1910.

Brazil.—Coffee, the principal crop, is grown in the southern States of Minas Geraes, Rio de Janeiro, Espirito Santo and Sao Paulo, which furnish more than four-fifths of the world's production. Since 1902 no coffee trees have been planted in Sao Paulo, and as it takes from four to six years for coffee to bear, the only elements of production are the trees in existence, almost all of which are in bearing at present. The last trees planted will be at their best and in full bearing in the course of the current quadrennium, while the influence of replanting exhausted areas, as well as of the intensive cultivation lately followed, will also reach its climax during this period. Under such circumstances it seems reasonable to suppose that the average production during the years 1909-1912 will be the same as for the previous quadrennium, plus 5 per cent. increase from freshly bearing trees, or in all about 10,000,000 bags per annum. Twenty years ago the world's consumption of coffee was between 9,000,000 and 10,000,000 bags, and ten years later it had risen to 13,000,000. At this rate, at the close of 1912 current consumption should reach 19,000,000 bags, especially if the official propaganda should be as effective as is expected.

Colombia.—The coffee crop of the Republic yields annually about 600,000 bags. About 25,000 bags are retained for home consumption, the remainder going to the United States and Europe, and meeting with increased favour in those markets. The principal coffee districts are the Department of Cundinamarca, which produces the renowned Bogota brand; the Department of Santander in the Ocana, Cucuta and Bucaramanga districts, and in the Tolima and smaller valleys of the Cordilleras.

Costa Rica.—The export of coffee from Costa Rica was, in 1909, 12,030,104 kilograms, as compared with 8,977,531 in 1908. The year 1908 was a very bad crop year on account of excessive rains. In 1905 the export of coffee was over 18,000,000 kilograms, in 1906 nearly 14,000,000 and in 1907, 17,300,000. The Costa Rican coffee trade is not increasing as it was hoped it would. Practically all of the Costa Rican coffee went to Great Britain. At present a considerable market for the product is developing in other countries, particularly in the United States. The export by bags for the year was as follows: Great Britain, 157,849; United States, 17,370; Germany, 9,824; France, 8,431; other countries 582; total, 193,056. Of this amount, the port of Limon on the Atlantic sent 168,195, and Punta Arenas on the Pacific sent 24,861. All of the coffee shipped to the United States was cleaned, but nearly half of that going to other countries was shipped in the husk. The coffee of the country has been famous for years and has been shipped almost exclusively to England, where it always obtains a good price, and has an enviable reputation for its quality and flavour. There are 30,000 hectares (74,130 acres) of coffee under cultivation.

Dominican Republic.—The exports of coffee in 1909 were valued at \$128,202, against \$325,153 in 1908. The Industry has suffered greatly from lack of sufficient capital.

Ecuador.—The coffee crop is estimated to be about 7,000,000 pounds annually.

Guatemala.—Coffee, which is the leading article of Guatemalan production and export, is produced annually to the amount of about 70,000,000

pounds. For 1908 the total output was smaller than in the three preceding years, the export quantity being a little over 60,000,000 pounds, as against 68,000,000 and 90,000,000 pounds in 1906 and 1907. The estimate for 1909 placed the output at about 81,000,000 pounds. The bulk of the coffee shipments were sent to Germany, that country figuring for 35,725,100 pounds on the export list, followed by the United States, 13,965,900 pounds, and England, 5,903,100 pounds. The value of coffee imported into the United States was in 1909 and 1908 \$2,832,451 and \$2,005,997, respectively.

Haiti.—The estimated area in the Republic devoted to coffee is placed at 125,000 acres, the plant having been introduced into the country some two hundred years ago. The period of production of each plantation is estimated to be about twelve years. Climatic and soil conditions are wonderfully favourable to the industry, and exports to the amount of 100,000,000 pounds annually were formerly made by Haitian growers. At present shipments do not total more than half of that amount. For the year ending December 31, 1909, the shipments of Coffee reported by the United States Consul at Port-au-Prince was 41,342,570 pounds.

Honduras.—Coffee is grown chiefly in the hill country at altitudes of from 1,500 to 3,000 feet. The coffee crop for the fiscal year 1909 amounted to 5,500,000 pounds, valued at 1,105,200 pesos. The exports were 653,053 pounds, value 153,635 pesos silver.

Mexico.—Next to the fibre class came coffee, exported to the value of \$6,272,163. Of this amount the United States took \$4,095,436, Germany \$901,085 France \$720,225, and great Britain \$420,473. The crop of 1906 and 1907 fell far below the yerly average of 88,000,000 pounds. The estimates for 1909 placed the crop at 81,000,000 pounds. The best grades of Mexican coffee come from the States of Oaxaca, Veracruz and Chiapas.

Nicaragua.—The area under cultivation has increased in recent years, the chief product being coffee. Nicaraguan coffee is of superior quality and commands good prices, the finest plantation lying in the north-western district. In Matagalpa and Jinotega the crops are worked by colonies of Americans and Germans, who apply the natural water power of the country to the operation of such machinery as is required. The coffee yield for 1907-8 was about 14,000,000 pounds. It is stated that the coffee crop of Nicaragua for the season of 1909 will probably yield a total of 4,000,000 pounds. The Department of Matagalpa is credited with 1,500,000 pounds and that of Jinotega with 2,500,000 pounds. The original estimate had been in excess of 16,000,000 pounds, 14,000,000 representing the yield for 1908. The 1909 crop promised to be one of the most abundant in the last ten years, but on account of the revolution hardly one-third of it was harvested, most of the men being in the military service.

Salvador.—The interests of the country are essentially agricultural, the principal crop being coffee, of which the annual output amounts to 37,500 tons, valued at approximately \$5,000,000. The quantity exported for the fiscal year was 63,330,077 pounds, value \$4,590,704.65. United States took \$770,200.50; France, \$1,601,013.33; Germany, \$937,494.37; Great Britain, \$196,341.75; Italy, \$430,811.48.

Venezuela.—The area under cultivation is estimated at about 200,000 acres, the number of estates being over \$33,000. The exports for the fiscal year were 46,926 metric tons, value 30,272,112 bolivars. United States took of this coffee valued at 21,262,484 bolivars; France, 11,345,946 bolivars; Germany 2,488,277 bolivars; Spain 1,286,633 bolivars; Cuba, 653,961 bolivars; Belgium, 223,460 bolivars; Austria-Hungary, 567,896 bolivars; Holland and colonies, 2,163,072 bolivars; Italy, 114,008 bolivars.

RUBBER,**Castilloa Rubber in Mexico.****PLANTATION ENTERPRISES IN VERA CRUZ.**

Inquiries having been received on the progress of rubber plantations in Mexico, the American Consul, Mr. William W. Canada, of Vera Cruz City, has prepared the following for the Mexican State of Vera Cruz:—

What the approximate acreage is in this Consular district in which the rubber-planting industry may be successfully carried on, and what the approximate acreage is now under cultivation, are questions to which no concise or definite answers can be given. There are no official records to show this. The State of Vera Cruz embraces 15,320,200 acres. How much of this is suitable for rubber planting has not yet been discovered. However, the rubber plantations operated by the numerous American and other companies have usually been located in the "tierra caliente" (hot lands), but more properly speaking, "low lands," and not in the higher regions. Information from good sources would lead one to estimate that about 50,000 acres have been actually planted with rubber trees from the time that the "boom" started in 1897 to the present. Of this number more than one-half of the acreage has been abandoned, having proved a complete failure, and of the rest it may be said that the rubber produced is just about sufficient to cover working expenses, and at the present prices for crude rubber there may even be a fair margin of profit for some of the planters. Those who are still continuing work are trusting to what the future may do for them.

Cost of Cultivation.—The age at which sap may first be extracted from the tree and the age at which it yields the greatest quantity are also subjects continually discussed without arriving at any definite answer. It is the opinion of experienced rubber planters that the "Castilloa" tree should be tapped at six years. In some few localities it may be sufficiently developed to admit of tapping at five years, or even at four, but in the latter case the rubber has proved of inferior quality. Wherever and whenever a tree is not sufficiently developed for tapping at the age of six years it should not be taken into account, for it is proof that conditions have not been favourable to its development. A tree that will yield a fair quantity of sap at six years may be reasonably expected to increase that yield by 10 to 15 per cent. for the following four to six years; beyond the age of twelve years nothing exact is known of the possible production. The approximate cost per acre for cultivating rubber trees until the yielding period and the amount of revenue which may be derived therefrom varies according to localities. In some sections in this district the tree ought to be brought to the age of six years for 15 to 30 cents gold for all outlay on the plantation, this wide difference being in cost of labour, which is higher the nearer the plantation is to a town or city. It ranges from 25 cents to 62½ cents gold per day. It costs on an average about 8 cents gold per acre to tap and cure rubber. These figures are based upon the present knowledge of the industry, but no properties now of the producing age were managed as cheaply formerly as the work may be done now. Of course this knowledge has been acquired by costly experiments which usually resulted in failures.

Yields.—Take, for example, 250 trees to the acre. At six years they would produce no more than 1 ounce of rubber per tree for each tapping, and as under favourable conditions they will stand this twice a year, the yield per tree would be 2 ounces a year, or 31·25 lb. from one acre. The value of this rubber at the point of shipment has ranged from 45½ to 79½ cents (United States currency) per lb. or 14·22 to 24·84 per acre per year. These prices varied little for years past, but recently the value has taken a

prodigious leap upward, and the present price of rubber, as invoiced at this Consulate, has reached the unprecedented figure of 1'48 (U. S. currency) per lb. This sudden rise in the price is something extraordinary, and may have been caused by speculation. The amount of American capital now invested in this industry and in this Consular jurisdiction (10,000,000 invested, but only 500,000 actually employed!) is a matter of conjecture only.

The money invested by shareholders in the U. S. A. in rubber plantation schemes can not be less than 10,000,000 gold; the amount actually employed in planting rubber, however, is quite another matter. It is my opinion that 500,000 gold would about represent the sum actually employed in tree planting and cultivation. One of the reasons for this discrepancy between stocks sold and money invested in planting rubber is that, when it became evident to a number of companies that tried to raise rubber that their enterprise had resulted in failure, some of the companies diverted their capital into other channels, as, for instance, the planting of sugar cane, sugar making and the production of alcohol.

Management.—As in every other new enterprise, a difference of opinion will always exist as to what is best to be done for accomplishing a given object, and, of course, the matter of cultivating rubber is no exception to the general rule. An expert in this line recently expressed himself to the effect that, aside from the soil, the atmosphere and winds were important factors not to be ignored. His experience had shown that rubber trees thrive best with a reasonable amount of shade, and he advocates wind-breaks for that purpose. Fruit trees may be utilised for this protection. And again, he differs with others in that he recommends tapping trees not before they have attained the age of 12 years, for thus they will have time for gathering vitality and will become good producers. However, time only will tell what would be best to do in Mexico, for that which may be advantageous in one part of the world may not be advisable in another. The worst feature of the Mexican rubber situation is that 90 per cent. of the numerous plantation companies that have operated in this Consular jurisdiction were managed in an incompetent and even corrupt manner, and the selection made of the lands for planting was, to say the least, injudicious. Perhaps millions of trees were set out on worthless sand or on shallow soil underlaid with rock and clay, and where there was no drainage after the heavy tropical rains. Many of these plantations are entirely worthless, and few of the remainder will ever pay more than working expenses.

Statistics of Output.—From Government statistical sources, the latest data obtainable, it is known that the entire production of rubber, wild and cultivated, in the State of Vera Cruz for 1908 amounted to 387,417 lbs. After careful consideration of all the facts, as far as known, relative to rubber culture in this State, and also when considering that the localities from which the greatest production has been drawn are not in the sections where rubber-planting companies have set out trees, but in the wilder portions of this territory, it is the Consul's opinion that certainly not more than 20 per cent. of the rubber produced in the State during 1908 was derived from cultivated trees. This he considers a liberal concession to the planters.

Rubber Tapping.

EFFECTS OF THE PRICKER ON THE CAMBIUM.

SOME NOTES BY MR. T. PETCH.

One of the most important discoveries made by Professor Fitting in his investigation into the effect of tapping on Hevea was the fact that the bark which is renewed beneath the pricker cuts contains an abnormal number of

"stone cells." Beneath each incision made by the pricker, a group of stone cells is formed, instead of the normal laticiferous tissue, and therefore the renewed bark after pricking contains less latex than normal bark. But he pointed out that further investigation was required to decide how long this formation was continued. Examination of a piece of pricked bark, six months after pricking, shows that the stone cells are still in contact with the cambium, though it is evident from their shape that the excessive formation is about to cease. This particular piece of bark had been pricked but not pared, and therefore it should show the effect of the pricker to the fullest extent, because the formation of new bark is less after pricking only than after pricking and paring. A second sample of bark was taken from a tree that had been pricked and pared, about twelve months after the operation. The thickness of the renewed bark was 4 mm. at the point beneath the pricker mark, and the abnormal group of stone cells extended from the exterior to a distance of 1.75 mm., from the cambium. Seven-sixteenths, or nearly one-half, of the renewed bark was of normal structure, and it would therefore appear that the formation of abnormal stone cells ceased about six months after pricking. In all probability it ceased earlier than this, for, as the following example indicates, the bark does not increase in thickness at a uniform rate. The increase is greatest immediately after tapping; afterwards it slows down until it ultimately approximates to that of the untapped bark.

A third sample was taken from a tree which had been similarly pricked and pared, three years after the operation. The thickness of the renewed bark was 5½ mm., and the groups of stone cells extended to a depth of 2½ mm., from the cambium. Here again nearly half the bark was of normal structure. It should be pointed out that isolated stone cells occur throughout the bark of *Hevea*. These may be distinguished from those due to the pricker by the fact that their long axes are, as a rule, parallel to the cambium, while the latter have their long axes usually perpendicular to the cambium. It may be concluded from the above that the effect of the pricker on the cambium passes off after about six months, but the groups of stone cells persist in the outer half of the bark after three years from pricking. As the greater part, or almost the whole of the latex, is obtained from the inner two millimetres of the bark, they will not have much effect on the flow of latex after three years. It must be mentioned that the measurements given above were made on bark preserved in alcohol, and that the outer dry brown bark is not included. On reading the descriptions of *Hevea* Diseases, one frequently finds that the exudation of latex from the stem is regarded as a characteristic symptom. For example, it has been described as the first symptom of "dieback," and one of the characters of "pink disease." I have made careful observations on this point, and have never been able to find that the exudation of latex can be taken as a sign of disease. Indeed, all the available evidence goes to show that diseased bark cannot yield latex. When trees are attacked by "canker" or "pink disease," the latex in the piece of bark attacked is coagulated in the latex tubes, and it cannot run out. That coagulated rubber may be found on bark attacked by *Corticium javanicum* or "canker" is undeniable, but its presence there is a secondary symptom, and it does not occur until the bark has been attacked for some time. There are two ways, at least, in which such exudations can happen. When bark is attacked by "pink disease," it dries up, cracks, and splits away from the wood. These cracks may extend into the surrounding healthy tissue and the latex then exudes from the latter. When the pink fungus spreads further, it involves the bark from which the latex issued, and therefore the strands of rubber are found on the diseased bark. But the

latex issued from this bark before it was attacked. The other way in which the phenomenon can occur requires the assistance of boring beetles. In the early stages of "pink disease" and "canker," the disease may affect only the outer half of the bark, the part next the cambium being still unaffected. If this diseased bark is bored by beetles, the latter may draw latex from the inner half. This especially occurs if they bore into the bark when the latex is stagnant: they then penetrate through the diseased bark right into the sound bark without drawing latex at the time, but the latex exudes from the hole when the tree has absorbed more moisture. After nearly six years' investigation of *Hevea* diseases it appears to me an axiom that only healthy bark can yield latex. The question is frequently asked whether the pressure of the latex inside the tree can burst the bark and in this way produce streaks of rubber on the stem. So far as the stems and branches which have reached the "secondary" stage are concerned the answer must be in the negative; all the supposed cases of this phenomenon are capable of explanation in other ways. Whether it can occur on green stems is doubtful. In *Hevea*, it most probably cannot; but the behaviour of *Manihot dichotoma* on some occasions after heavy rains suggests that it can happen in that species. Given the necessary apparatus, the question is one which can be easily solved.—*Tropical Agriculturist*.

Nandi Rubber.

The *Kew Bulletin* remarks:—"We have recently received for determination from Mr. D. E. Hutchins, Chief Conservator of Forests, British East Africa, dried specimens of a rubber-plant found in the Nandi forests, British East Africa. The plant proves to be *Landolphia ugandensis*, Stapf, described in the *Flora Trop. Africa* (Addenda), iv. 1, p. 589, from specimens, collected by Mr. M. T. Dawe in Dumu forest, Buddu, Uganda, at 4,000 feet. Mr. Hutchins sends us the following information about the plant:—

"This rubber vine is of peculiar interest. It yields a first-rate rubber, exists in considerable quantities in the Nandi forests, and it grows to the size of a Liana or Monkey-rope. It is believed to be the only commercial rubber which can be worked continuously occurring naturally in an extra tropical climate. The Nandi forest lying almost immediately under the Equator is at an elevation of between 6,000 and 7,000 feet; and has an abundance of mist and cloud tending further to reduce the temperature, which I estimate to be about, on an average, the same as Cape Town. I have recently returned from a visit to the Nandi country, and forward herewith a note on the yield and conditions of growth of this interesting rubber."

Yield.—The present normal production of rubber from the Nandi forest is estimated to amount to 7 tons yearly, worth about £2,000 at present Mombasa prices: this is on a basis of only one-third of the vines being tapped for rubber yearly. If it is found that less than two years' rest is sufficient for the vines, the yearly output will rise to 10 or 15 tons, and this again will be doubled if the present proposals for planting the Nandi rubber liana are proceeded with. It is estimated that at present there is an average of 7 lianas per acre with an average diameter of 2 inches and a maximum of 5 inches. The yield per vine tapped is averaged at 1 oz. Last year when there was indiscriminate tapping in the forest, the total collection amounted to 16 tons. Twenty per cent. of the rubber is lost in smoking and drying. The rubber lianas occur scattered in small patches and strips throughout the wetter side of the forest. On account of this dispersion of the lianas, a man collecting the rubber does not average above 1 lb. a day of raw rubber.

Coagulation.—This has been effected with salt (the salt water being smeared on the surface of the liana) by chewing, and by the use of a fruit

termed "Nogute." This fruit is produced in abundance on a small tree or shrub, and both the tree and fruit bear a close resemblance to the well known Keiapple (*Aberia caffra*) of South Africa.

Noguk or Nōkōk is probably a species of *Flacourtia*.

The acidity of the fruit is about that of good vinegar, and rather less than bottled lime juice. What the acid is has not been determined.

Method of tapping.—The present method is by shaving off slices of the bark to the cambium layer, but it is difficult to prevent these cuts being made too deep, and when they are made too deep the tissue dies progressively above and below them. Slitting diagonally with a knife seems a better method, and this is now being tried.

The Nandi rubber liana has a fruit in the form of a largish green ball like an orange, in the pulp of which the seed is immersed. The fruit contains so much latex that the rubber from it might pay for the cost of collecting the seed. The fruit is edible, and has a pleasant taste of cucumber. After eating it bits of rubber are left in the mouth, something like the wax when honeycomb is eaten. In places the lianas show an abundant reproduction, and they are said to shoot again readily when cut. Generally, however, there is not much reproduction to be seen, though monkeys eat the fruit and distribute the seed. There seems no difficulty in propagating the Nandi rubber liana from the nursery plants in the usual way, and this has now begun.

Nandi Climate.—The climate of the Nandi Plateau, though under the Equator, can only be described as extra-tropical in character. I compute the mean temperature as being between 60° and 61° (Fahr.), while the rainfall is ample for soil fertility, and the mist and clouds sufficient to mitigate excessive solar radiation. Rainfall figures for five years show a mean of about 75 inches. Kāpsābit, in the centre of the plateau, lies at an elevation of 6,300 feet, according to my barometer readings; and this, I understand, tallies with previous observations.

The Nandi Natives are not a numerous tribe. They are estimated not to amount to more than about 30,000. At present they seem more likely to decrease than increase, owing to the rapid spread of disease amongst them. Six years ago they were a warlike tribe with habits like the Masai, and troublesome on account of their raids on the Uganda Railway. They are located in a fine forest containing much good timber, of which the area is estimated at 150 square miles. They do not practise kumri cultivation, and destroy the forest but little.

In the Congo State.

H. M. Consul at Boma (Mr. H. G. Mackie), in a report on the development of the Congo State, remarks:—

Rubber, which constitutes roughly three-fifths of the total exports from the Congo, would seem to offer a fairly sound basis for the creation of an industry conducted on modern and scientific lines. According to an opinion recently pronounced by an expert the climate and soil are satisfactory, but the wrong species of plants have been selected for cultivation. Although of late years the exports of rubber have decreased, . . . the volume of the rubber trade is still substantial, and compares favourably with the exports of rubber from Angola.

In Venezuela.

H. M. Vice-Consul at Caracas is informed that a Venezuelan cocoa-planter planted some 150,000 trees of *castilloa elastica* (some of which are now 10 to 12 years old) among his cacao trees, but that the quantity of rubber exported by him is very small.

THE SOIL.

Effects of Heat on Soil.

Mr. C. Harold Wright, Government Laboratory, Trinidad, B. W. I., writes to *Nature* :—

" Mr. A. D. Hall in his opening address to the Agricultural Sub-section of the British Association at Sheffield mentioned ' a process of heating the soil before sowing ' and a process of firing the soil preparatory to sowing the crop, ' both of which seem very similar to ' burning bush ' as practised in the West Indies. On reading Russell and Hutchinson's paper on ' Partial Sterilisation of Soil ' in *Journ. Agric. Sci.* for October, 1910, it struck me that their work afforded a probable explanation of ' burning bush, ' and I now make the suggestion in the hopes of obtaining some evidence. The process seems to be similar to that known as *Chena* in Ceylon, *ladang* in Malaya, and *jhumming* in India (see J. C. Willis, ' Agriculture in the Tropics, ' pp. 1 and 2), and perhaps some one with experience of the East could throw further light on question.

" It is a common practice in Trinidad for a small cultivator to rent a piece of abandoned land, which is cleared by burning the ' bush ' in the dry season. In the wet season the clearing is generally planted with maize, which is usually followed by cassava, yams, tannias, etc. In a few years the cultivation is no longer remunerative, and the land once abandoned quickly goes back to ' bush. ' One explanation is that the ashes of the burnt ' bush ' supply a certain amount of plant food in a readily available form (the nitrogen in the plants burnt would, of course, be lost). This plant food would presumably produce an increased yield, but the effect would not last many years. Another—and I think a more probable—explanation is, that the burning results in a partial sterilisation of the soil, with a greater production of ammonia. The fact that the maize is the first crop grown after the bush has been burnt is significant, since it is a crop which is benefited by a nitrogenous manure."

Bacteria and Agriculture.

The many and important parts played by bacteria in the work of the world are now widely recognised. Certain of these minute forms of life deal out death—these are the pathogenic bacteria, the disease-producing agents of such maladies as tuberculosis, typhoid fever, diphtheria, and so on. Other species of bacteria bring about, in ordered stages, the decomposition of dead organic matter, and in doing so provide the raw material out of which new generations of plants and animals are constructed. To yet other species are confided the all-important task of enhancing the fertility of the soil by the " fixation " of free nitrogen ; that is, by causing the nitrogen of the air to combine with other elements to form compounds which serve as sources of nitrogen to the higher plants. Nor does this complete the tale of the activities, beneficent and malign, of bacteria. Besides being the scourges of mankind, the scavengers of the earth, and fertilisers of the soil, they play essential parts in the chemical operations which underlie all manner of industrial processes, such, for example, as cheese and butter making.

With the recognition of the varied and fundamental parts played by bacteria in the world's work, it has become one of the definitive objects of biological science, not only to complete the discovery of their activities, but also to control them ; for this is the first step towards the systematic scientific exploitation of bacteria in the interests of mankind.—*Garlander's Chronicle*.

The Planters' Chronicle.

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THE U. P. A. S. I.

(INCORPORATED.)

The "Planting Member."

After attending the meeting of the Legislative Council of Fort St. George, the Hon'ble Mr. J. G. Hamilton arrived in Bangalore yesterday morning, and left the following morning for his estate.

The next Council meeting is likely to be held in February, 1911.

The Scientific Officer.

On Wednesday morning Mr. R. D. Anstead, B.A., started on a tour in South Mysore, which is intended to be completed about the 12th instant, so that he will probably return to head-quarters by the 14th or 15th idem.

A meeting is to be held at Saklaspur on the 10th instant.

Coffee Seeds.

Orders for the special seeds referred to in last issue are coming in slowly. Planters who are likely to want supplies are requested to kindly state their probable needs as soon as possible, so that all orders may be combined, with a view to getting the lowest prices that can be arranged.

A part of the *Coffea robusta* seed ordered is now on the way from Java, and the rest is to be despatched promptly. In the absence of an invoice the exact price cannot be stated yet.

Bombay Hydro-Electric Project.

An advertisement relating to this great project is published on another page. As far as Bangalore is concerned, the scheme has received an amount of financial support that has caused some surprise locally, as Bangalore is not considered to be a rich town. Several lakhs of rupees have been attracted, nevertheless. Besides this, various Maharajas and Rajas in India have taken up debentures and shares in amounts ranging from Rs.40,00,000 downwards. The Managing Agents, Messrs. Tata, Sons & Co., of Bombay, are to be remunerated by a commission of 5% on net profits and actual office expenses—terms that are certainly fair to proprietors; and the arrangements made for the supervision of operations are of a nature to satisfy the most exacting critics.

The scheme has no direct bearing on the planting industry, but planters are investors also, and the opportunity is afforded them to back a scheme of a very interesting and promising kind. Sir George Clarke, the Governor of Bombay, has expressed his faith in it, and a good many people will probably wish to take part in an enterprise which marks the entry of India on ventures of colossal magnitude.

Scientific Officer's Papers.**XLIX.—DISPERSION, VITALITY AND GERMINATION OF SEEDS.**

Flowering Plants reproduce themselves very largely by means of seeds, which are contained in some form of receptacle, known botanically as a fruit whether it is edible or not. There are many different forms of fruits, and these forms are closely related to the methods adopted for the dispersal of the seeds. Some seeds are dispersed by the wind, in which case they may be very minute and light, as in the case of Orchids, or they may have special parachute-like attachments so that they may float along in the air, as for instance the seeds of many *Compositae*, of which the Goat Weed (*Ageratum mexicanum*) is an example. Some fruits are explosive, and fling the seeds considerable distances, as is the case with Pará Rubber. Others again, are designed to be dispersed by animals, and such may have hooks of some kind so that they cling to the fur of animals brushing against them, and are thus carried away until they are rubbed off, or the animal cleans its fur, and deposits them on the ground. There are many common instances of this method of seed disposal in India, and the persistent way in which the seeds of Spanish Needle stick to one's putties illustrates the method excellently. Edible fleshy fruits are designed for the purpose of seed dispersal by birds and other animals which eat them and the coats of the enclosed seeds are hard enough to resist the digestive fluids of the stomach and so they are voided unharmed to germinate. Coffee fruits fall into this class, and the sweet pulp of the berry is designed to attract birds, monkeys, &c., to feed on them. These are only a few of the ways in which seeds are dispersed, and all kinds of most wonderful devices occur to ensure their wide distribution. The seed coats also differ very widely, and may be only thin and soft so that the seeds absorb water and germinate quickly, or they may be so thick and hard that the seeds take a year or more to germinate, as is the case with Ceará seed. The vitality of seeds too differs very much; some lose their power of germination almost at once, and others can retain it for many years, as long as thirty in some cases, or even more. The seed of *Castilleja elastica* loses its vitality in a few days, and the reason why it is so difficult to make seed of *Manihot dichotoma* and *Manihot piauhyensis* germinate is probably largely due to this reason. Mr. Hamilton, the Planting Member, who has during the last few years experimented largely with this seed, tells me that he finds that the percentage of germination depends almost entirely upon the freshness of the seed. If it is quite fresh it will germinate, but if it is old and the kernel is waxy, no filing, or soaking in hot water, or any other dodge will make it grow, and its only use is for eating purposes; he informs me that the kernels are quite good eating and taste very much like Brazil nuts. At Rs.13 per maund they are, however, rather an expensive luxury.

Tephrosia purpurea.

In the case of some seeds soaking in hot water, or in acids, before they are sown improves their germinating powers. *Tephrosia purpurea* seed, which has lately been recommended as a good cover crop, appears to have a low germination if sown without any treatment, and is much improved by a preliminary soaking in Sulphuric Acid. This treatment, according to Mr. Sampson, the Deputy Director of Agriculture, Southern Division, Trichinopoly, raises the percentage of seeds which germinate from 16% to 80% (Sc. O. Note No. 79). Mr. Harrison, the Government Chemist, at Coimbatore, has very kindly sent me the following description of the method of procedure:—

“Enough concentrated Sulphuric Acid is employed to allow the seeds getting well covered with it. I do it by pouring the required amount over the seeds and then stirring them until uniformly moistened. About one hour’s

soaking should give you from 70% to 75% germination, but there is *one thing to be very careful about*. Heat is generated during the treatment and, in consequence, there is a tendency for the seeds to cake together and finally carbonize. This is easily got over by stirring up the whole mass at frequent intervals. After treatment, the acid is poured off as far as possible and kept for future use, and then the whole mass is gradually added to a vessel of running water and kept there until free from acid. The seed is then dried or, if such a course is preferable, it may be sown wet. I do not think that any delay in sowing after treating the seed will affect the germination. Certainly I have never noticed any ill effect by keeping it for several weeks, but this is a point which you should test."

Seed of *Tephrosia* will in the future, therefore, be treated, as far as possible, with Sulphuric Acid before it is issued from the Office of the U. P. A. S. I.

RUDOLPH D. ANSTEAD,

Planting Expert.

THE ADVANCE IN COFFEE.

There has been an important advance in coffee prices in the chief markets of the world during the past few months. From a speculative point of view, coffee has been neglected for many years, and the present movement bears some resemblance to the remarkable boom of 1886-88, although the causes are different. General speculation then was the principle cause of the rise, but the upward movement now is largely backed by increased consumption. The trade for a long time have allowed their stocks to run down to a very low level, and despite the hand-to-mouth system of buying which is still widely adhered to, when fresh purchases have been resorted to higher prices have been found unavoidable. Plentiful supplies for a number of years caused buyers in the chief consuming countries to operate only when stock was needed; consequently, when the time arrived that reduced crops and depleted visible stocks became strong factors in the situation, active buying soon forced values to a higher level. Another reason for the advance has been the extraordinary rise in the Brazilian rate of Exchange, which stood at 15½*d.* in the early part of the year, and had advanced to 18¾*d.* in September, subsequently receding to 16¾*d.* Since the rise in exchange to the highest point and later decline, the speculative market has shown considerable fluctuation, but prices generally remain firm.

Attention is directed mainly to Brazil, where the crop now being marketed will be much smaller than the previous one. Much interest also attaches to the next crop, that of 1911-12, but the estimates put forward are so wide and divergent—from 9 to 14 million bags—that it would be wiser not to estimate at all when figures are so unreliable. Prospects of next Santos crop are considered to be better than the current crop. There has been reason to expect a large outturn, but news from the Brazils is frequently mistifying. Should the yield, however, turn out of only average extent next season, present values would seem to be justified; but if the outturn is much larger than is generally anticipated, prices will find a lower level. Recently the demand for mild descriptions has fallen off, but the assortment on offer is poor, stocks being so much reduced, and there appears little prospect of cheaper rates before the new crops arrive in quantity next year.—*Grocer*, Nov. 5, 1910.

Notes and Comments by the Scientific Officer.

85. *Soil Analyses.—Mr. Kelway Bamber's Fees.*—I am often asked what Mr. Bamber, of Ceylon, charges for making soil analyses, and I have recently received a list of his fees, which is published for general information :—

Analysis of soil—one sample	} at one time.	Rs. 50
Do do two samples		90
Do do three samples		120
Do do four samples		150
Do do five do		175
Do do six do		200
Do Compound Artificial Manure		30
Do Crushed bones or Oil Cakes		15
Do Lime or Lime Stone	..	10
Do Tea	..	50
Do Water	..	3)

Recommendations as to Manuring
based on Analysis furnished by
applicant—

One	Analysis	..	10
Two or three	Analyses	..	15
Six	do	..	20

The Soil analysis consists of the Mechanical composition, and Chemical composition, the latter showing the percentage of : Moisture, Organic matter, Lime, Potash, Phosphoric Acid, Silica, Nitrogen, and Oxides of Iron, Manganese, Aluminium, and Magnesium, together with a statement of Acidity.

86. *Nitrolim in Queensland.*—Mr. J. C. Brunnich. Chemist to the Department of Agriculture and Stock, Queensland, says that Nitrate of Lime, and Nitrolim, are being imported into that State in large quantities. He remarks, " These artificial fertilisers, which are really produced from nitrogen in the air, have given excellent results in a very large number of manuring trials, conducted the last three or four years, all over the world. I believe that our soils, of which a great number are rather deficient in lime, will derive particular benefit from these nitrogenous manures. The form of nitrogen in nitrolim is apparently nearly as available as the nitrogen of nitrates, much quicker in action than ammonia nitrogen, and not depending on the presence of lime in the soil. Nitrate of lime has the great advantage over nitrate of soda of not draining so easily through the soil. Nitrate of soda rather tends to exhaust soils, and spoils their physical conditions by depriving them of the lime, which faults are prevented by using nitrate of lime. Nitrolim is a very fine slate black powder, not liable to cake, and may be mixed with almost any artificial manure. As already stated, the action of this manure is only slightly slower than that of nitrates, and the large amount of lime (up to 50 per cent.) which it contains is in itself a great advantage."

I have already expressed the same opinion with regard to our South Indian Soils, and I believe that Nitrolim will prove of value to our Coffee and Tea growers.

RUDOLPH D. ANSTEAD,

Planting Expert.

DISTRICT PLANTERS' ASSOCIATIONS.**South Mysore Planters' Association.**

General Meeting of the South Mysore Planters' Association held at Chickanhalli on the 10th and 11th November, 1910.

PRESENT :—J. G. H. Crawford, Esq., President, the Hon'ble Mr. J. G. Hamilton, Planting Member of the Madras Legislative Council, Messrs. Graham Anderson, C.I.E., T. Anderson, H. G. Bower, Fremlin, J. A. Harris, St. J. Hunt, P. Hunt, C. Lake, A. R. Park, W. F. Scholfield, S. Sladden, and Woodbridge.

The Notice calling the Meeting having been read the minutes of the previous Meeting were confirmed.

Owing to the resignation of Mr. C. K. Pittock, it was necessary to appoint a new Honorary Secretary, and Mr. Thiselton Anderson was appointed to act as Honorary Secretary until the close of the official year.

Messrs. C. Lake and S. Sladden were asked to audit the accounts, and kindly consented to do so.

The President as delegate to the Dussarah Representative Assembly then read the following report :—

11

1st November, 1910.

To The Committee and Members
of the South Mysore Planters' Association.

Gentlemen,—I am pleased to be able to submit my report of what was done by your delegate at the Dussarah Representative Assembly at this Bungalow of Chickanhalli and trust that many meetings beneficial to our Association may be held in it, that the change effected in the Association in having two groups will be found satisfactory in every way, and tend to strengthen the influence of the oldest associated body in Mysore.

Mr. Harris is to be congratulated on being the prime mover in effecting this change, which I think has the approval of every member of the S. M. P. A. There is a report that he is going Home next year for good, so we may not have the benefit of his experience and advice at future meetings, but I think I am voicing the hopes of all in saying that we shall look forward to seeing him occasionally anyhow as a guest if not an active member of the S. M. P. A., which owes a great deal to his energy and the interest he has always evinced in its various undertakings.

I have little really of moment to report. The subject I was asked to interview the Dewan about, was in connection with the query by the Government of Fort St. George to the U. P. A. S. I., in June last as to "whether any difficulties have arisen in connection with the operation of the Workman's Breach of Contract (Act XIII of 1859) owing to offenders absconding to Native States and if so whether in the opinion of the U. P. A. S. I. any special measures are desirable to provide for their arrest in such cases." I ventured to press on the Dewan's attention the fact that Mysore by a simple notification issued on the 23rd July 1878 and under instructions from the Government of India has always accorded the same attention to processes emanating from the Courts of S. India as if they had been issued by the local courts and in this action was the only State granting such facilities; in other words it receives no reciprocal advantages. In view of the reply of the U. P. A. S. I., "that if Act XIII of 1859 included a clause to

provide for arrest in such cases it would be desirable the privilege should be made reciprocal," I ventured to suggest that this was a matter well worthy of the consideration of the Government of Mysore, and this led the Dewan to say that while sympathising with us he would before taking any action in the matter like the subject put on paper and the date and number of the query of the Madras Government to the U. P. A. S. I. with any useful comments sent him, as he wished the case to be made as strong as possible fearing a rebuff. I think, gentlemen, a strong case can be made out and should be submitted to Mr. Ananda Rao as soon as possible.

The N. M. P. Association's delegate, Mr. W. Fouke, and I attended the sittings of the Representative Assembly daily, I might say twice a day, and spoke on some matters that seemed to affect our interests. These, briefly, are as follows :—

SUBJECT No. 126.—"Coffee kharab lands applied for cultivation may, in cases where there is no objection from the neighbouring land owners and others, be given to the applicant for the usual upset price of Rs.10 per acre, instead of being put up for sale by auction as at present. This measure will save much delay in getting the required lands."

This proposition was made by Mr. Siddegowdah, of Mudigere, and was opposed by Mr. Fouke and myself as undesirable and likely to lead to abuses.

SUBJECT No. 128.—By Mr. S. Narsinga Rao, N. M. N. P. A. :

"The restriction laid down by Government regarding the cultivation of a margin of 50 yards on either side of streams may be reconsidered."

We were prepared to support this, but the Dewan would not discuss the subject.

SUBJECT No. 129.—By Messrs. Narasinga Rao and C. Vasudeva Rao, Chickmagalur Taluq :

"The North Mysore Native Planters' Association is not in favour of the levy of cess on coffee which the European Planting Community in Mysore is urging on the Government of India for the popularization of Coffee."

"If the question should come up before Government it is requested that the native planters, who form a large majority and own a much greater extent of coffee land than the European community and who also produce by intensive cultivation more maunds to the acre, may be consulted before any decision is arrived at."

This we opposed on general grounds, pointing out that benefit to all would accrue from a well-planned campaign in England pushing Indian coffee, that if we remained quiet while Brazil was at work supplanting us we might wake up one day to find the small amount of our produce used in the United Kingdom even smaller. We asked the Durbar for their sympathy and aid should the Imperial Government impose the cess. I also congratulated the N.M.N. Planters on their good yields (5 cwt. per acre as their representative alleged in the Assembly) from "intensive cultivation" and pointed out that on a yield of 20 maunds per acre nine pies per maund could surely be spared by them for pushing the sale of Indian coffee generally.

SUBJECT No. 131.—By Mr. Thamuaiya, Hassan District Board :

"Similar to the disposal of relinquished dry and wet lands by malki sale, the relinquished coffee lands may also be dealt with, without

reference to the upset price of Rs.10 per acre. Moreover as it is very troublesome and costly to improve such coffee lands the shraya system of revenue may be allowed."

We did not oppose this, as only the abrogation of the upset price was aimed at.

SUBJECT No. 132.—By Mr. Govindaraja Modaliar, Mudigere Taluq :

"Here and there are patches of Government waste land of all descriptions of less extent than the paid minimum, which do not allow of being applied for cultivation. Such lands may be assessed and granted to the neighbouring occupant at a price fixed by a punchayet. This arrangement would be convenient to the land owner and profitable to the Government."

Mr. Fouke and I deprecated any arrangement that would facilitate the acquisition of land without publication, excepting of course land coming under the rules to this effect already sanctioned by Government.

SUBJECT No. 151.—By Mr. Siddalingappa, Gundlupet Taluq :

"Even though the revenue rules direct darkhasts for assessed unoccupied lands must be disposed of without delay, they are invariably put to auction and thus the darkhastdars have to wait and derive no advantage from their application. Therefore it may be ordered that a sagwali chit may be given under section 41 Land Revenue Code as soon as the darkhast application is presented."

We opposed, as the object of this request seemed similar to Nos. 126 and 132.

SUBJECT No. 177.—By Mr. Davood Saheb, Mudigere :

"An assessment of Rs.3 is levied on an acre of rubber land. This is heavy. If it is reduced to Rs.2 it would be an encouragement to Native Planters to take up this industry."

While arguing I would not personally support this as with others in an interview with the late Dewan we agreed to the amount as fair, I have since altered my opinion.

SUBJECT No. 208.—By Mr. V. Raghavachar, Mysore Taluq :

"If budget statements are published before the members have delivered their subjects to the Taluq authorities, it will enable them to discuss many questions relating to them."

Although not particularly interested in the budget, we thought we might apply Mr. V. Raghavachar's idea to the Representative Assembly's subjects generally and pray Government that a month previous to the meeting of delegates in Mysore a précis of the subjects likely to be discussed be circulated (submitted) to all associations and representative members, as it might be found (as in the present case), many affecting our interests directly would be brought up; this would give the members deputed time to obtain instruction from their respective bodies as to how to act. We did nothing in the Darbar, but resolved to bring the matter before our Associations for representation to Government, and it remains with you, gentlemen, to decide the course to be pursued. Mr. G. V. Scovell, as delegate for the Bangalore Taluq, has promised to support us in this matter.

SUBJECT No. 243.—Lantana Extirpation Act by Messrs. C. Srinivasa Row, Chickmagalur Taluq, Davood Saheb, Mudigere Taluq, Agali Venkataramiah, Salva Taluq, Narahariah and Chennalingappa, Nela-

mangala Taluq, M. Subba Rao, Heggaddevankote Taluq, A. Ramana, Yedatore Taluq, and Chicksubba Rao, Hansur Taluq.

- (1.) "Lantana Extirpation Act may be introduced. A penal clause is necessary for the enforcing of clearing of lantana on occupied lands."
- (2.) "Raiyats use lantana and prickly pear for hedging purposes, which not only render the locality unhealthy but take away much of the valuable land by overgrowth. It has been repeatedly urged that a regulation might be passed for the extirpation of lantana and Government were pleased to order that the subject was under discussion. The matter may be expedited."
- (3.) "For checking the growth of lantana last year it was observed that it was in contemplation to introduce some kind of insects from Mexico for the destruction of lantana. In the Western part of Hunsur Taluq several villages have been deserted. Coorg has taken steps to eradicate the same."

Hence it is proposed:—

- (i.) "That the Forest Department may be required to have lantana pulled out by elephants in reserved forests where at present safe growth is ensured inasmuch as no outsiders are admitted into those forests!"
- (ii.) "That landholders may be prohibited from planting lantana hedges, the prohibition being enforced with a rupee fine in case of disobedience."
- (iii.) "That amildars be empowered to require holders of private lands by means of a notice to clear lantana in their premises or to have it cleared by sircar at the cost of landholders, such cost not exceeding one year's kandyam on such lands."
- (iv.) "That steps may be taken to clear lantana in sircar lands."

You will notice, gentlemen, that evidently to make it appear that there was a feeling throughout the whole of Mysore for such an enactment as the above, the geographical distribution of the applicants has been so arranged as to lend colour to this view. The impracticability not to say absurdity of clauses *i*, *iii*, and *iv* is obvious.

We opposed strenuously and pointed out that lantana can only be eliminated by continuous cultivation, that the suggestions of the above gentlemen were chimerical, expensive and vexatious and would not secure the end desired. That the question of lantana was a peculiar one, it enriches the soil but was admittedly a source of danger to grazing lands but served as an excellent nursery for sandal, and that taking everything into consideration we were of opinion that with a view to lessening the spread, land covered with lantana might be given out for a number of years free of tax to *bonâ fide* cultivators, but that if there was any penal legislation, with a retrospective effect, for its eradication the object aimed at would be lost, as the holders of lantana covered land not being able to or unwilling to comply with the order would resign lands now paying tax to Government. We also deprecated the introduction of any insect pests for the destruction of lantana not knowing what they would turn their attention to while destroying this shrub or after.

The Dewan's Secretary replied that penal legislation was not contemplated but that if the owners of land on which this plant grew agreed to remove the same they would be granted five years' remission of taxation in regard to holdings in their possession for this purpose, and twelve years'

remission in respect to new lands, and in sircar waste land the Forest Department would tackle the problem. We ventured to point out its impossibility and that the magnitude of the task had evidently not been grasped.

The Malnad Gowdahs asked for full right over lagani trees in their lands, and to be allowed to have shops for the disposal of the toddy. It is an old subject brought up yearly and, as the Revenue Commissioner said the request would not be acceded to, we did not move in the matter, nor in Subject 244, in which Mr. Senappa, Kolar District advocated "the opening of as many toll gates as possible" to meet the cost of road upkeep, as he at the last moment withdrew it.

We, further, strongly supported a motion on the part of one of the delegates for regulating the weights and measures in Mysore and the abolition of the present cumbersome and confusing system. We suggested that the English system of weights might be adopted and that a standard seer and colligar for buying and selling should be introduced.

To conclude, there is another subject deserving the notice of the Association, *viz.*, the erection of a new hospital in Saklasapur, which I understand from good authority has been sanctioned by Government and the sum of Rs.14,000 budgeted for. The D. P. W., however, contemplate putting a ferro-concrete roof to this building; this as you are aware is likely to prove unsuitable and very damp in a place like Saklasapur. I would therefore suggest that roofing more adapted to the Malnad requirements be placed on the new dispensary and other connected buildings and Government be written to to this effect and our reasons given for venturing to offer an opinion on the matter.

As Mr. G. V. Scovell expressed a wish to join the S. M. P. A. I have much pleasure in proposing him as a member.

J. G. H. CRAWFORD,

President, S.M.P.A.

The Hon'ble Mr. J. G. Hamilton proposed that the report be adopted and that a vote of thanks be accorded to Mr. J. G. H. Crawford for the efficient manner in which he had performed his duties.—Carried with acclamation.

SCIENTIFIC OFFICER FUND.

Mr. J. A. Harris opened the discussion in the following words:—

I think we are all agreed that Mr. Anstead is making himself most valuable to the whole planting community. The grasp he has got of the details of the different industries during the short time he has been amongst us is no less astonishing than his capacity for work. We must not, however, take undue advantage of this latter quality. When I saw the programme of tours that was sketched out for him at the U.P.A. Meeting I was aghast at what he had before him, in addition to all the other work he has to do.

In future beyond all this he will have his duties in connection with the laboratory, which is fast nearing completion. To do justice to all, it seems to me, he must have assistance. If we work the willing horse too much he will break down, and he is much too valuable an asset for us to allow this.

You have all no doubt read Mr. Browne's speech at the recent Meeting of the N.M.P.A. and noticed the resolution that was passed at that Meeting. I am entirely in accord with that resolution. I consider that we must give Mr. Anstead assistance and in order to do so we must dip fairly deeply into our pockets. We cannot get a good thing without paying for it, and no doubt more scientific aid would be invaluable to us; and what would an assessment

of 4 annas or even 8 annas an acre be, compared with the good that might accrue to us from the concentration of scientific aid on one particular industry ?

I trust we shall to-day pass a resolution unanimously in favor of appointing an assistant to Mr. Anstead who shall devote himself to the interests of coffee, and also make provision for paying our share of the necessary expenditure.

The Hon'ble Mr. J. G. Hamilton prefaced the following remarks by saying that he, being totally unaware that Mr. Harris was bringing forward this subject, had also drafted resolutions with a similar end in view and that although he proposed, with the permission of the Meeting to read his speech as prepared, he did so not with any desire to move his own resolutions as an amendment but merely to show that he was in entire sympathy with the scheme. He, therefore, had much pleasure in seconding Mr. Harris' proposition.

He said :—Mr. Chairman, I presume that all present have read Mr. C. H. Browne's speech on the subject of the Scientific Officer, which was delivered at the recent Meeting of the N. M. P. A. at Balehonnur.

There does not seem to be much more to say on the subject, and I am fully in accord with every one of his points. It is all put very clearly and plainly, and perhaps few men have compared, as Mr. Browne does, the amount which they spend on the Scientific Officer, with the amount allotted to other items of expenditure. Put as it is in his speech it really looks very remarkable that we cannot spend more than 1 anna per acre on so large a subject. It does seem as though we ought, either to do without any Scientific Aid, which must be unthinkable to most observant planters, or else to take the matter in hand and put things on a proper footing.

We have got a good man we all know, though perhaps few know him as well as I, but if we kill him with overwork we shall have to import a stranger, who may not be so keen or so good. Here is a man who has already dealt with kindred troubles on the other side of the world so started among us with a far better chance than any purely book, or laboratory trained man could ever do ; let us take care of him, for I warn you from personal knowledge that he will not take care of himself ; and let us try to get him some help. I would not cut short his field work to any great extent, but I would give him a chance of doing it in a more leisurely and comfortable way. I am not going to even sketch any method of doing this, for my part I say leave this to him ; but I am going to propose that we do something towards putting him in a position to lay some plan before us. Show him the cash, and he will very soon make some proposals about spending it. He is as little greedy for money as a man can be, but he does need more and will take it if offered.

It seems possible that Mr. Browne has had to modify his personal wishes to meet the general views of the Meeting, for while he speaks of 8 annas, the Resolution only demands 4.

If this has been the case, and it is not quite clear from the report I hold in my hand, I sympathize with him very fully, as this is the sort of thing that many of us have to put up with sometimes. We get up in the morning full of hope and enthusiasm and by midday after 5 inches of cold criticism from a less hot-blooded audience, we simmer down and think ourselves lucky if we are not put outside in the wet altogether.

Some here may not be in a position to definitely answer for acreages which they represent, but do not own, but that need not prevent their giving an opinion. The N.M.P.A. do, it is true, ask for a definite promise, and if the

Meeting considers that we are in a position to give this, I shall have the greatest pleasure in accepting an amendment which will convey as much as we can guarantee.

The milder form which I propose with reluctance is as follows :—

I. That this Association fully concurs with the N. M. P. A. in the belief that no one man can cope with the vast amount of urgent work to be accomplished in S. India by Scientific officers and are prepared to increase their subscription.

II. That this Meeting accepts 4 annas per cultivated acre as a suitable minimum, and will urge the payment of at least this rate on all members.

III. That the President and Honorary Secretary be requested to draw up a very strong circular letter on the subject, one copy of which shall after approval by the Committee be sent to every member of the S. M. P. A., whether in India or not, and 6 copies to every Association in the U. P. A. for circulation to its Committee, and that they also be requested to use every endeavour, with the help of the Committee, to get answers in time to enable them to place the matter very fully before the Annual General Meeting.

I must tell you clearly that I do not approve of this, but have tried to meet those who are not in a position to bind absentee proprietors or partners.

Before I ask you to put the Resolution before the Meeting, Sir, I hope that you will not consider me out of order if I touch on a more general subject also alluded to by Mr. Browne. I don't think that whenever the subject has come up I have failed to express similar opinions. I am not prepared to raise a discussion to-day but I remain, as always, convinced that we are not supporting our own Associations or the U. P. A. to an extent which will give us the best returns for our money.

You do well with the meagre pittance we allow you but if we give you more we might expect even more from you, and while I expect the U. P. A. to do much more for us than it has done some day it is impossible, unless we feed it more, to demand even that the present standard shall be maintained.

I doubt if any planter can speak with more authority than I can of the pressure of work at the present day, and I say emphatically that it is at a dangerous point. A larger or better class subordinate staff may very soon be necessary, and there is no money. We exist on a bare living wage and have not a penny for anything without circulating the hat, a most unsatisfactory and often unpleasant situation.

After a lengthy discussion, which was continued on the second day of the meeting, it was resolved :—

1. "That this Association is in entire sympathy with the resolution passed at the recent meeting of the North Mysore Planters' Association regarding the Scientific Officer Fund and is of opinion that if sufficient funds can be secured the U. P. A. S. 1. be requested to arrange for the deputation of a special Assistant to Mr. Anstead who shall devote himself solely to the interests of Mysore and Coorg. The qualifications required by such an Assistant shall be decided on by the three Associations in consultation with Mr. Anstead."

2. "That the co-operation of the North Mysore Planters' Association and the Coorg Planters' Association be invited."

3. "That in order to secure the necessary funds to meet the above and all other Association expenditure the assessment be raised to 8 annas per every cultivated acre of Coffee and 2 annas per every acre cultivated of Cardamoms. This, however, shall be subject to confirmation by the next Annual General Meeting."

4. "That Gentlemen who are not landowners in the Hassan and Kadur Districts may become members of the Association by an annual subscription of Rs.10."

MR. ANSTEAD'S TOUR IN SOUTH MYSORE.

The Hon'ble Mr. J. G. Hamilton explained to the Meeting that owing to pressing engagements Mr. Anstead had expressed a desire to have his coming tour limited to a fortnight's duration.

The members present willingly acquiesced, and a Sub-Committee, consisting of Messrs. J. A. Harris and C. Lake, was appointed to draw up a programme for submission to Mr. Anstead.

GROUPS.

In order to meet the requirements of the situation owing to the division of this Association into two groups, the following rules with regard to the proper working of these groups were formulated:—

1. Members of the Association shall belong to whichever groups they may elect.

2. Members of one group shall be encouraged to attend the meetings of the other group and shall be allowed to speak but not to vote.

3. The Honorary Secretary of the Association shall be Secretary of the group to which he belongs. The other group shall elect a Secretary out of its members.

4. Meetings shall be held at least five times a year. The Mudigere group meeting in Mudigere, and the Saklaspur group in Saklaspur.

5. Dates of meetings shall be arranged between the two Honorary Secretaries. Not less than a week shall intervene between the meetings of the respective groups, and a week's notice or more shall be given to members. Emergency meetings for any purely local subject may be called at the discretion of the Honorary Secretary of the group concerned—it shall not be necessary to consult the other group Secretary but notice shall be sent as soon as possible to that Honorary Secretary.

6. The Honorary Secretary of the Association shall place before each meeting of either group, such correspondence, papers, etc., as are of general interest.

7. The Honorary Secretaries of the groups shall furnish each other with minutes of meetings as soon after they have been held as possible and these they shall place before the next meetings of their respective groups.

8. The Honorary Secretary of a group shall give effect to any resolutions passed by his group which undoubtedly relates to purely local matters or concerns only members of his group without further authority.

9. If a group pass a resolution relating to general affairs or which concerns members of both groups, it shall be submitted to the other group for consideration, and if both are in accordance therewith it shall be at the discretion of the Committee of the Association either to give effect to it or to submit it to a General Meeting.

10. A Quorum of any group shall consist of one-third of the members of that group (such third being actually present) odd numbers over any number divisible by three not to count—*i.e.*, of 13 numbers 4 shall form a quorum—of 11 the quorum shall be 3.

11. That the Honorary Secretary of a group shall be refunded any expenses he may incur in connection with Association Affairs by the Honorary Secretary, S. M. P. A.

12. Any disputes between the groups shall be settled by a Special General Meeting of the S. M. P. A.

It was then resolved :—

That the Honorary Secretary be requested to write to the Deputy Commissioner of Kadur District, and the Amildars of Mudigere and Belur Taluks asking them to kindly take cognizance of any representations which may be made to them by the Group Hon. Secretary under the provisions of Rule 8.

REVISION OF THE GENERAL RULES OF THE ASSOCIATION.

After a general discussion the following amended rules were passed :—

1. The Association shall be called the "South Mysore Planters' Association and shall consist of two groups.

2. All Proprietors or Managers of Estates in Mysore shall be eligible, or any other persons who may be elected at a General Meeting, one black ball in three to exclude.

3. The Association shall be managed by a President, Honorary Secretary and Committee, who shall be elected at the Annual General Meeting (which shall be held at Saklasapur and Mudigere alternately) as provided by Rule 4.

4. The Committee shall consist of 8 members, *viz.* 4 from each group. The President and Honorary Secretary shall *ex-officio* be members, and the group to which they belong shall elect two other members. The Honorary Secretary of the other group shall *ex-officio* be a member, and that group shall elect three other members.

5. A General Meeting shall be held at least once a year at a central place to be fixed by the Honorary Secretary of the Association. Committee meetings shall be called at the discretion of the President and Hon. Secretary.

6. At General Meetings a quorum shall consist of one third of the Members on the Rolls of the Association actually present. Proxies properly stamped and handed to the Honorary Secretary of the Association at least 7 days before the date fixed for holding the Meeting and stating for what purpose they are to be used shall be allowed.

In counting, numbers over any number divisible by 3 shall not be considered.

7. Each member shall pay an annual subscription of

(a) 8 annas per every cultivated acre of coffee land he either owns or represents.

(b) 2 annas per every cultivated acre of Cardamom land he either owns or represents.

(a and b being subject to confirmation at the next Annual General Meeting).

That gentlemen who are not land-owners in the Hassan and Kadur Districts (*i.e.*, within the sphere of influence of the Association) may become members of the Association by an annual subscription of Rs.10.

The whole is payable in advance on April 1st in each year.

8. Special General Meetings may be called by the President or Honorary Secretary, or by special request of three members of the Committee or five members of the Association, and in the notice calling the meeting, information shall be given as to the subjects to be brought forward, and no other important subjects shall be discussed.

9. The President and Honorary Secretary shall *ex-officio* be delegates to the U. P. A. S. I. Annual Meeting.

10. The Committee shall be deputed each year to decide what contribution shall be made to the U. P. A. S. I.

11. Officials residing in the District may by acclamation be elected Honorary Members of this association.

MEDICAL AID.

The Hon'ble Mr. J. G. Hamilton then addressed the meeting in the following words :—

With your permission, Sir, I wish to propose the following Resolution :—

"That the Hon. Secretary be requested to draw the attention of the Senior Surgeon to the inadequate stock of some medicines, particularly Quinine in a suitable form for Injection, kept in Local Fund Dispensaries, and to request that larger supplies may be sent."

I have not been able to find out what other medicines are running short but it has been a frequent complaint in Mudigere at all events that all are given out with a very niggardly hand; I am only concerned at present with the amount of Quinine suitable for injection, which is ludicrously small if this is to be regarded as a proper form of administering the drug. I find that the cost is the same or very nearly the same whether it is given in the old-fashioned way or by injection, for though the drug used for injection is more costly in the first instance than the Pink Powder, there is less waste as none is taken away and thrown into the jungle on account of its nasty taste, and also only one-fourth, if so much, of the quantity is necessary. We are not qualified to speak from the professional point of view, but the use of the needle is becoming more general throughout all ranks, so we may justly conclude that there is much good in it.

I do not think that I am in any way out of order if before leaving the subject I make some reference to the evils of Malaria and the absolute necessity for all Governments to do their best at any cost to fight it. We know better than most men that the population of our Malnad is vanishing, whatever Census statistics may show. I do not anticipate that they will show the usual increase, but if they do I shall refuse to believe that it is due to anything else than the yearly improvement in registration. We know quite well that the people are not here now. We know quite well that there used to be swarms of little children in all the villages and that even where the villages are left there are few children in them. Some villages have practically if not actually disappeared. We also know that men, women, and children, local or imported, none are of the physique they used to be, even when one remembers that many of those who used to work some years ago were "Famine Remnants," and while other causes may be at work it is common talk amongst us that Malaria is the chief.

We have the right to speak with authority; few other Europeans see the people as we see them all around, and it is our duty as well as to our own interest to take up matters like this and press them strongly in the proper quarters. The best Mysoreans recognize the danger, and we shall not want support from a very large number of good men if we begin to work. They have taken an interest in medical matters and while there are some who prefer old-fashioned remedies and even charms there will be found a good many who believe in quinine, if in no other medicine. Much has been done to cheapen and popularize quinine, and a cooly knows quite well what to send for if he wants an excuse to stay away from work, but I have grave doubts whether all that we or Doctors give out is actually consumed. If Injection is good, let us have a proper supply of a good drug, but if it is bad let us have a definite and authoritative pronouncement on the question.

This resolution was seconded by Mr. H. G. Bower and carried unanimously.

Proposed by Mr. J. A. Harris and seconded by the Hon'ble Mr. J. G. Hamilton :—

"That this Association regrets to notice that Government have expressed their inability to establish a dispensary at Gonebide. It considers that this is most urgently needed and deputes the Honorary Secretary to bring the matter again before Government and to urge the early establishment of this dispensary.—Carried unanimously.

Resolved :—"That the attention of Government be drawn to the constant failure of the Mudigere Taluk Treasury to maintain an adequate supply of small change, and that this Association do point out the great inconvenience caused, especially in Crop."

Rubber.—Resolved :—"That a subscription list be circulated among those members interested in Rubber, as subscriptions have been invited in view of India's representation at the coming London Rubber Exhibition.

Resolved :—"That the Government of Mysore be invited to assist the London Rubber Exhibition with a donation, as the cultivation of Rubber is advancing in the State."

Indian Members.—It having been brought to the notice of the Meeting that the South Mysore Native Planters' Association had to all intents and purposes ceased to exist, certain Indian Proprietors of large Coffee Estates had expressed a wish to join this Association: it was resolved to welcome as members any Indian gentlemen who may be duly elected at a General Meeting and who agreed to abide by the Rules of the Association.

Police.—Mr. A. R. Park brought to the notice of the Association an instance of unseemly behaviour on the part of one of the members of the Police Force stationed at Hambat, and it was decided that his representation to the Inspector-General of Police should receive the support of the Association.

Acreage represented by Members.—Mr. C. Lake pointed out that the Association's acreage figures were in need of revision, and the Honorary Secretary was requested to draw up a new list of members with the acreage each represents for submission at the next Annual General Meeting.

Labour Laws.—The Hon'ble Mr. J. G. Hamilton reported progress.

Mr. Graham Anderson then addressed the meeting as follows :—

The present position and future prospects of Labour Legislation is a subject well worthy of critical examination, and a brief retrospective consideration of circumstances connected with it appears for many reasons to be desirable.

Page 349 of the *Planters' Chronicle*. Act XIII of 1859.

"In June last, the Government of Madras requested to be informed whether any difficulties have arisen in connection with the operation of the Workmen's Breach of Contract (Act XIII of 1859) owing to offenders absconding to Native States, and if so whether in the opinion of the United Planters' Association any special measures are desirable to provide for their arrest in such cases."

"Inquiries have been instituted and a reply will be sent shortly. Naturally, however, Planters who are working under Act I of 1903 and not under Act XIII of 1859, have expressed a desire that attention be called also to the difficulties which they have to face in the matter of the absconding of labourers to Native States."

Proceedings of the
United Planters' Association.

Page 381 of the *Planters' Chronicle*.

Act XIII of 1859.

That the Secretary be instructed to reply to the inquiry of the Government of Madras in the following terms:—That Members of the District Associations do not appeal to Act XIII of 1859 when they have reason to believe that the defaulter has absconded to Native States, as under present conditions it would be only waste of time, but the U.P.A.S.I. is of opinion that if Act XIII of 1859 included a clause to provide for their arrest in such cases, it would be desirable and is further of opinion that this privilege should be reciprocal."

Page 331 of the *Planters' Chronicle*.

Non-Service of Warrants.

Proceedings of the United Planters' Association.

"That this Association place on record its opinion that the non-service of warrants under Act I of 1903 and Act XIII of 1859 is still of frequent occurrence in the Coimbatore District and Mysore; and request that Governments concerned increase the Police force in those Districts in which labour is largely recruited for Plantations work."

Page 376 of the *Planters' Chronicle*.

Act I of 1903.

Proceedings of the United Planters' Association.

"That this Association, in view of the refusal of those Districts that have not hitherto adopted Act I of 1903 to accept it, considers that at future Meetings the subject of Act I should not appear on the Agenda paper except under the conditions of Rule 10 of the U. P. A. S. I."

Page 376 of the *Planters' Chronicle*.

Extradition.

"That the Government of Madras be approached with the view of ascertaining clearly whether Extradition will be automatically obtained on the adoption of Act I of 1903 by Planters in Native States or whether it would be necessary to have special alterations made in existing treaties with such States."

It must never be forgotten that Mysore is the only State which grants facilities for the execution of Warrants or Extradition, although it receives no reciprocal advantages.

This arrangement was made by the simple issue of a Notification by the Chief Commissioner of Mysore on the 23rd July 1878 under instructions from the Government of India and has long continued to be part of the law of the Mysore State. Although Act XIII of 1859, is not a Criminal Law and is not contained in the Schedule of the Extradition Act XXI of 1879, the Notification of the Chief Commissioner of Mysore that all processes issued by Courts in British India were to receive the same attention as if they had emanated from the Courts in this Province, is regarded not only as authority for the execution of warrants but also for Extradition.

"Attention must here be drawn to the fact that this demand for the Extradition of defaulting labourers from Mysore is altogether outside of the Extradition Act, XXI of 1879, because breaches of contract cognizable under Act XIII of 1859 are not offences included in the Schedule to the Extradition Act and it is worthy of note that such a demand cannot be made on Travancore or Cochin." * * * *

"The Madras Government negatived the proposal, pointing out that persons, accused in Mysore under that Act (XIII of 1859) who may escape into British Territory cannot be handed over to the Mysore authorities, the offence not being mentioned in the schedule attached to the Extradition

Page 29 of the Proceedings of the South of India Planters Enquiry Committee.

Act (XXI of 1879)" and remarking that they were not prepared to ask for the extradition of persons committing offences under Act XIII of 1859 from the Government of Cochin when the Magistrates in British Territory are unable to reciprocate the procedure on their part."

Among the numerous valuable suggestions made by the South of India Planters' Enquiry Committee, the Government of Madras adopted the plan of introducing a Labour Act which is styled Act I of 1903.

This very complicated enactment was never asked for or contemplated by Southern India Planters. It has been introduced into a few of the Districts in the Madras Presidency, and although modifications have been asked for, the Madras Government has for the most part declined to arrange for them.

The Planters' Enquiry Committee clearly stated * * * * *

Page 37, Planters' Enquiry Committee's Report.

that a special law like the Ceylon Labour Ordinance (No. 11 of 1865) would be inappropriate to this country, explaining that all they (the Planters) wanted was that the existing law should be made intelligible and should be strictly enforced by efficient Magistrates and Police."

The Mysore Government has very sympathetically given the assurance that the new Act will not be introduced until the Planters ask for it and that even then ample opportunities will be afforded for making suggestions for the necessary modifications to suit the local requirements in Mysore. The principal difficulties of the situation are (1) that if the Madras Government have declined to make amendments which are considered to be essentially necessary by those Districts which have already given the Act a trial, it is very doubtful if they will allow any alterations to be made to suit the requirements of Mysore: (2) and it is absolutely impossible to predict what measure of reciprocal facilities will be granted.

So far as Mysore interests are concerned the latter difficulty is the greater of the two.

If Act 1 of 1903 is ever to be adopted for use in Mysore it is absolutely necessary that it should be amended so as to render it suitable for local requirements to and that arrangements should be made according complete reciprocity in regard to the service of warrants and extradition.

It was for these reasons that the new Act has not been yet asked for, and it was for the latter reason that a request was forwarded to the Government of Mysore, asking that information should be obtained from the Government of Madras, as to what measure of reciprocal facilities would be accorded under the New Act.

"We have shown that British Planters have difficulties to contend with which may be remedied by an amendment of the Labour Law; but the case of the planting industry in the three Native States of Mysore, Travancore and Cochin calls far more urgently for consideration and constitutes a real grievance, requiring an effectual remedy, which it is the duty of the Committee now to try and suggest."

In mentioning the suggestion that the practice of surrendering defaulters by Mysore should be discontinued, the Enquiry Committee made the following remarks:—

Page 64.

"It seems to us that the abolition of the practice referred to might set free some Mysore labour for employment on Mysore Plantations and thus diminish the inequality of treatment which has been brought out in this report."

"But to the credit of the Mysore Planters they absolutely decline to take up the idea and all the evidence we have received from them is against the suggestion. They will not admit that such a measure would benefit them, partly because they consider that the labour which has become used to emigrate from Mysore to British plantations would continue to go there, partly because the Mysore planting districts are at a greater distance from such labour than the British Plantations, but mainly because they hold that the absence of control over Mysore labour in the case of British Plantations would bring about the same demoralization of the cooly as has taken place in the case of British labour imported into Mysore in respect of which no extradition is permitted if the defaulter absconds into British Territory. And feeling strongly, as they do, this want of control in their own case, they are very reluctant to advocate any measure which would place the British Planter under the same disability."

"The obstacles to this simplicity (and uniformity of law) and uniformity are technical and could be entirely obviated by a convention either embodying a Labour Law and the procedure for working it or referring to the existing law and laying down a procedure for giving effect to its provisions with a view to reciprocity between the Courts of the various tracts concerned." We do not conceal the fact that without some form of extradition such a measure would be of no avail." * * * * *

"The States concerned would we are convinced object to no guarantee which the British Government might think necessary to require for the proper constitution of Courts possessing jurisdiction."

It is of course absolutely impossible to foresee, what changes the Madras Government will introduce; but taking into consideration the inquiries made in June last and the reply of the United Planters' Association of Southern India and the deadlock which has occurred in regard to the new Labour Act (Act I of 1903) it is permissible to anticipate that the subject will be accorded the fullest consideration.

That Mysore may share in any amelioration of existing conditions is earnestly to be desired.

It was then resolved:—"That the Honorary Secretary be requested to forward a copy of Mr. Graham Anderson's speech to the Dewan of Mysore."

Labour Difficulties.—Mr. J. A. Harris opened this discussion in the following words:—

There are many Estates which have felt the pinch for Labour during the current season and a number have suffered from the old bugbear, the absconding maistry. Yet we appear to be doing little to mitigate these troubles, which undoubtedly will increase unless protective measures are adopted.

The U. P. A. S. I. appointed a Committee to investigate new fields, but we have heard of no results so far and I have little hope that a Committee comprised of men who have little opportunity of meeting and acting in concert will effect any good.

We have all read of the allurements offered to Southern India coolies to go to Ceylon, and I think the proposal of the Central Travancore Association to sound a counterblast quite advisable.

But though I am a strong advocate for united action on the part of the whole planting community of Southern India I fear as regards labour difficulties we can only do so with respect to main principles—details each district must deal with itself; and I am convinced that the time has come for us Mysore Planters to take measures to protect ourselves. At the present moment we are the weakest of the three planting industries in Southern India—though prospects for coffee look brighter than they have done for

Planters' Enquiry
Committee's Report.
Page 64-65.

Planters' Enquiry Com-
mittee's Report.
Page 63.

many a year—and we shall feel the pressure for labour more severely than either of the others. Let us therefore be first in the field in establishing a Labour Agency which shall have for its object the protection of our interests with respect to the labour we employ.

Now I have not had time to work out a detailed scheme ; but I will give a brief sketch of the lines on which I think a Labour Agency might be established.

1. I propose that the two Mysore Associations should act together.
2. That they establish a Labour Agency in South Canara with Head Quarters in Mangalore whose function shall be to assist members of the Associations
 - (a) to ascertain the *bona fides* or otherwise of Labour recruiters.
 - (b) to draw up and have executed agreements with Labour recruiters.
 - (c) to keep a register of all advances made to Labour recruiters and to give tickets of release to such Labour recruiters on hearing from their employers that they have fulfilled their contracts.
 - (d) to assist employers to recover advances from absconding maistries.
 - (e) to assist honest recruiters to obtain their coolies and to recover advances from defaulters.
 - (f) to search for and establish new sources of labour.

This is a very imperfect sketch of the function the agency might perform, later on it might develop a system of registration of coolies and a Labour Board of Control might be appointed with which should rest the rates of wages and perhaps of advances.

In times like those which we have probably in front of us, an abiding fear is that rates will be raised by an individual under panic when it may be quite unnecessary and do more harm than good. A Board of Control would prevent such foolish acts, and an individual who was in stress for labour, say to pick his crop, might appeal to the agency for help and failing this might reduce his picking contract, which would be equivalent to temporary enhanced rates, but would not necessitate a general rise of wages.

We must in the times which are coming do our utmost to guard against panic. It is difficult to reduce rates once raised, and a rise in wages would not necessarily mean increased supply. It may be said that men who did not belong to the Association would act independently. I believe the Agency would prove so useful that men would join the Association in order to make use of it.

Think what an immense boon it would be to have an organisation which would have a registry of all the respectable maistries in our recruiting districts with full particulars of their character, property, etc., to which we might appeal for help whenever a recruiter absconded and to which our maistries might appeal. The moral effect of such an institution would be invaluable, and our maistries and coolies might be protected from the allurements which Kanganies from other countries hold out to them. If new fields of Labour should be tapped, branch offices would be opened and the same advantages would accrue.

To achieve, however, what I suggest funds will be required—we shall have to dip fairly deeply into our pockets, but I believe we should be repaid a hundredfold. One constantly hears of losses of Rs.500 and Rs.1,000 and more from the absconding of scoundrelly maistries, and such sums are frequently absolutely lost, there being no trace and no power to trace the defaulter. I ask you, would it not be worth the while of any Estate of say 200 acres to pay Rs.100 in order to reap the benefits that would accrue from such an agency ? The worry and anxiety it would save us would, be

immense, and I believe such losses as I have referred to might in a great measure be obviated and when made there would be a greater hope of recovery.

The Hon'ble Mr. J. G. Hamilton said that many of the present day Ghaut Coolies were emaciated and could not do a contract which was thought nothing of in former days, and although he felt certain that the rates of wages were bound to rise, he doubted whether we could procure a better class of cooly by offering increased pay.

After a general discussion it was proposed by Mr. J. A. Harris, seconded by Mr. J. G. H. Crawford, and carried:

1. "That this Association approves of the idea of establishing a Labour Agency under the auspices of the North and South Mysore Planters' Associations."

2. "That the co-operation of the North Mysore Planters' Association be invited."

3. "That if the North Mysore Planters' Association agree to co-operate a Sub-Committee representing both Associations be appointed at an early date to draw up a detailed scheme."

The Hon'ble Mr. J. G. Hamilton then asked whether members had seen the Rules used in Travancore to decide disputes about crimping and absconding, and if so whether anything on similar lines would be considered with a view to the adoption of some such rules.

Mr. J. G. H. Crawford said that he had never experienced any difficulty in the matter, as when it was pointed out to him that a cooly was under advance to a neighbouring Estate he always sent the cooly back, and as far as he knew this was the general procedure throughout our district, and he thought it far better to leave it as an affair of honour than to form rules which could not be enforced.

The general sense of the meeting being to the same effect the subject was dropped.

Cardamom Stealing.—Mr. Woodbridge, in a brief speech, explained to the meeting his reasons for bringing forward this subject. He said that as each Cardamom season came on small shop-keepers opened up shops in the vicinity of Estates and closed them as soon as the crop was over and as many of them dealt in Cardamoms in a small way it was a simple matter for them to receive stolen Cardamoms from coolies in exchange for goods. Many of the European Estates lost 50% of their crop in this way, and the Native Planter was robbed to even a greater extent. Owing to the fact that this cultivation is carried out in small ravines scattered all over an Estate it was practically impossible to keep an efficient watch and the only way to prevent this annual loss was for the Police to keep these receivers under strict surveillance, and with this end in view he would suggest that the Inspector-General of Police be written to requesting him to kindly depute special detectives who would travel about the Malnaad during the picking season.

Resolved:—"That a representation be made to the Inspector-General of Police calling his attention to the existing unsatisfactory state of affairs as regards thefts of Cardamoms and pointing out that practically no attempt is made to improve matters."

The President proposed a cordial vote of thanks to Mr. and Mrs. Harris for their kindness and hospitality, which was carried with acclamation, and the Meeting then closed with a vote of thanks to the Chair.

(Signed) THISELTON ANDERSON,

Honorary Secretary.

CORRESPONDENCE.**U. P. A. S. I. Labour Committee.**

I was hoping to be able to ask you to publish a domestic occurrence by now, but it was failed to come off.

The difficulties of reproduction have been too great for my "Mamma Map," who has returned to me from the Press where I thought there was the best chance of her fulfilling her destiny. I am now about to try elsewhere.

I am sorry for the delay.

AYLMER Ff. MARTIN.

Srivilliputtur, 26-11-1910.

More Scientific Aid to Mysore.

With regard to the very interesting speech made by my brother planter Mr. C. H. Browne, member of the N. M. P. Association, at the quarterly general meeting of the N. M. P. Association held at Balehonnur on the 6th October last regarding the need of scientific aid especially in improving the cultivation of coffee : I acknowledge the cogency of the suggestions made by him. Mr. Browne is an old and highly respected planter of long experience and was a pioneer in the planting industry in Mysore. From him originated the idea of appointing a Scientific Officer. We have now an able Scientific Officer, Mr. R. D. Anstead. Mr. Browne has the honour to be the President of our N. M. P. Association, and his services were appreciated very much by every member of the Association and we owe him a debt of gratitude. I, as a planter of 20 years' experience in coffee, offer my fullest support to Mr. Browne's proposition *re* the securing of the services of an assistant to Mr. Anstead to devote all his time to coffee and its diseases and pests, such as Green bug, Stump rot fungi, leaf disease, black rot, &c. With the advance in scientific knowledge, we shall be able at least to keep down the various pests, if not eradicate them, and thus improve the coffee trees and the quality of the beans.

I do not think that a planter who has any interest in the coffee industry, will grudge to pay a small subscription, say about as. 8 per acre, in return for the substantial benefit that will be derived by taking up Mr. Browne's valuable suggestions. Unless plantations are worked with the aid of scientific knowledge good money will not be spent in the right direction ; and the small extra outlay will be nothing in proportion to the benefit to be derived. It will be foolish economy to try to save small sums of money now, as it will lead to the losing of the whole property in course of time if early steps are not taken to revive the coffee trees. It will be no use repenting when it is too late. It is already high time to seek some remedy for the evils that attack coffee. I need hardly point out here what a useful part the *Planters' Chronicle* has played, although Mr. Anstead's time and energy are divided over the large area of Southern India, the work of which is so heavy and unwieldy to tackle. I am of opinion that it would be advisable to secure the services of an assistant solely devoted to North Mysore and another to South Mysore under our able and energetic Scientific Officer, Mr. Anstead. The smaller jurisdiction will keep them acquainted with the peculiarities of soil, climate, and the condition of each estate, and they will be able to favour the planters with their scientific and practical knowledge.

S. L. MATHIAS.

TEA.**Worm-eaten Tea Chests.****ANOTHER SERIOUS WARNING.**

The following letter has been sent round the various shippers of tea in the Port of Colombo :—

Dear Sir,—The following letter has been addressed by the Director of Quarantine, Melbourne, to leading importers of tea in the Commonwealth of Australia :—

"I have the honour to bring under your notice that certain insects (proclaimed under the Quarantine Act) have been found by officers of this division, in the wood of tea chests arriving at this port."

"Under section 67 of the Quarantine Act a penalty of £500 is provided in case of importation of any noxious insect or any pest, and, as the insects which have been found in such tea chests are of a highly destructive nature, it has been decided that rigorous action shall be taken in order to prevent their introduction into the Commonwealth."

"I would suggest that you communicate with the shippers informing them of the above. It might also be pointed out to them that, if reasonable care is taken in the selection of timber the danger should be entirely obviated and the consequent trouble and expense would be avoided."

It is understood that, should any signs of insects be found in chests containing tea sent down to Australia, the importation of the tea will be prohibited. On behalf of the steamship Lines forming the Australian Freight Conference, I beg to notify you that, should any tea be refused admission by the Quarantine Authorities at Australian Ports, the shippers of the tea will be held responsible for all expenses incurred by the ship as the result of any action taken by the said authorities.—Yours faithfully (Sd.) R. S. PHILPOTT, for the Australian Freight Conference, November 12th, 1910.

In China.

In his report on the Trade of Foochow for the year 1909, Mr. Consul Playfair states :—

That there is still a market for China tea somewhere, pessimistic reports notwithstanding, is evidenced by the increased quantity exported during 1909. . . .

Green tea practically disappeared from the returns, only 5 cwts. being exported. . . .

The following particulars of the course of the market in 1909 have been kindly supplied to me by a British merchant :—

Congous.—The total crop was about 40 per cent. less than the large production of 1908. The natives were aware that orders in hands of foreigners were much smaller than usual, and in consequence very cautious in sending down supplies; even with the reduced supplies and prices some 10 to 15 per cent. less than the previous season, foreigners were very slow to invest. Second and third crop teas were very slow of sale and seem to be in less demand every year. I understand that some of the finest teas realised good prices on the home markets, but the general result of Congous cannot be considered as satisfactory. The average price of the crop was 18½ taels per picul, which average is due to so few common teas being manufactured.

Souchongs.—The production of teas from this district was about 34 per cent. less than in 1908. Prices for the finest lines were about on a par with the previous seasons, but for medium to fine teas there was very little demand at first, and many good teas were bought at 15 to 20 per cent. under last season's prices. The supply of genuine Souchongs was probably about 30 per cent. under last season's, but proved ample for foreign demand. Very limited supplies of common teas were sent down, and these met with a

slow sale. The crop was a good one, and the teas were approved of in London and Enrope generally. I hear that fine and finest teas, owing to their good quality, realised satisfactory prices in London, but for medium and lower grade teas there has been scarcely any demand. The average price of the crop was 22 taels per picul, which is high, but is accounted for solely by the reason of so few common teas being made. Both in France and Germany, the demand for medium and lower grades Souchongs appears to be falling off and Ceylon and Java teas are taking their place.

"Oolongs.—Very large quantities of these teas were sent to this market, and total supplies were about 44 per cent. in excess of last season's, so it is to be presumed that the natives were able to purchase the crude leaf at very low prices. The arrivals amounted to 80,528 half-chests, of which 4,000 half-chests were destroyed by fire whilst in native godowns. The crop was up to the usual low average of quality which has ruled here for some years past, but the high average price of 22 taels per pecul was realised for this large production, which must have given handsome results to the tea men. It was confidently expected in America that the Formosa crop would be short, and this led to a strong demand for Foochow Oolongs. Heavy rains at the end of a dry summer in Formosa completely upset these expectations, and the crop of Formosa teas instead of being short resulted in an excess of some 500,000 to 600,000 lbs., so the Foochow teas bought at figures above their intrinsic value have in consequence met a flat reception in New York. . . .

"Flowery Pekoes were in very full supply, but fine to finest qualities were all bought as soon as shown at about last year's prices. Large quantities (far in excess of the demand) of the lower grade teas were made for the Persian market, which led to very low prices of these descriptions, and brought the average price of Pekoes for the season to 97 taels per pecul.

"Tea dust.—A few of the better kinds were taken for foreign markets at the average price of 6 taels per pecul. The accumulation of stocks of this very undesirable commodity is becoming a serious matter, and the quality is so low that even at the reduced duty it does not pay to ship the stuff for chemical purposes, and it is a great pity that the Chinese Government could not see their way to entirely remove the duty on this article when shipped for chemical purposes and so help to alleviate what is becoming a serious menace to the tea trade to this port."

In Germany.

In a report on the Trade of the Consular District of Berlin in the year 1909 it is remarked :—

At the beginning of the year there were large stores of Chinese tea especially Souchong and Congo, warehoused in German ports. The demand for inferior and medium quality tea became very lively through the introduction of the Imperial Finance Reform Bill, under which the increase in the duty on tea was 75 pf. (from 25 pf. to 1 mark per kilo). Shortly before the new bill came into force brisk business took place, which slackened down after the new duties were imposed. It can be assumed, however, that the consumers who laid in large stores before the introduction of the new law will become more accustomed to the use of tea and that in future the tea trade will attain a greater demensions in Germany.

In Berlin several attempts have been made to popularise tea by the introduction of so-called Indian tea shops. These shops being daintily fitted up and supplying a good quality of tea have grown in public favour. The establishment of numerous teashops in the principal towns of the Empire, it is assumed, will do much towards making the beverage popular, as tea, however, costs more than twice as much as coffee it is scarcely expected that it will become a national beverage.

The British Tea Duty.

The actual receipts from the tea duty in 1909-10 were £5,678,000, and as about £1,000 was withheld, until the Finance (1909-10) Act, 1910, became law, the real receipts were £5,679,000. This is less by £367,000 than the actual receipts of 1908-9, but these were swollen both by a postponement of clearances from 1907-8 and by forestalments at the end of the year, which also diminished the receipts of 1909-10. The increase in true revenue, that is to say in consumption, appears to be nearly 3 per cent. Quantities retained for consumption and net receipts of duty :—

Year ended March 31.	Rate of Duty. Per lb.	Quantity retained. Lb.	Net Duty received. £.
1901	6d.	251,005,485	6,264,515
1902	6d.	232,115,384	5,792,967
1903	6d.	239,393,569	5,975,483
1904	6d.	262,758,827	6,559,705
1905	8d.	251,279,852	8,271,866
1906	(from April 20, 1904) 6d.	261,585,171	6,814,908
1907	(from July 1, 1905) 5d.	265,680,089	5,588,288
1908	(from May 14, 1906) 5d.	279,167,804	5,807,947
1909	5d.	290,628,968	6,046,211
1910	5d.	272,991,442	5,677,790

In view of the disturbances caused by anticipations of a change in the duty, the following table gives a truer picture of the increase in the consumption of tea. The average value as declared on importation is also shown. Quantities retained for consumption (calendar years), triennial averages, quantity per head of population, and average declared value per lb.

Calendar Year.	Quantity retained. Lb.	Triennial Averages. Lb.	Quantity per head of population. Lb.	Average declared value. per lb.
1895	221,731,490	226,927,000	5'73	{ d. 9'63
1896	227,722,561			{ 9'55
1897	231,328,156			{ 9'36
1898	235,353,767	242,537,000	5'95	{ 9'13
1899	242,506,079			{ 8'82
1900 (a)	249,751,032			{ 8'54
1901	255,824,617	255,184,000	6'08	{ 7'67
1902	254,398,837			{ 7'20
1903	255,327,559			{ 7'21
1904 (b)	256,477,452	261,583,000	6'05	{ 7'24
1905 (c)	258,776,914			{ 7'26
1906 (d)	269,503,175			{ 7'40
1907	273,768,525	277,446,000	6'23	{ 8'13
1908	275,239,751			{ 7'96
1909	283,330,463			{ 8'16

(a) Duty increased from 4d. to 6d. per lb. on 6th March, 1900.

(b) Duty increased from 6d. to 8d. per lb. on 20th April, 1904.

(c) Duty reduced from 8d. to 6d. per lb. on 1st July, 1905.

(d) Duty reduced from 6d. to 5d. per lb. on 14th May, 1906.

Percentages retained for consumption from India, Ceylon, China, and other countries, in the last five years :—

	1905-6.	1906-7.	1907-8.	1908-9.	1909-10.
Tea of British East Indies (except Ceylon) ...	58'05	59'96	57'94	58'44	55'30
Tea Ceylon ...	34'46	32'79	32'78	32'61	34'41
„ China (including Hong Kong & Macao) ...	2'50	2'16	3'95	2'89	3'06
Tea (Other Countries) ...	4'99	5'09	5'33	6'06	7'23
	<u>100'00</u>	<u>100'00</u>	<u>100'00</u>	<u>100'00</u>	<u>100'00</u>

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The Registered Office.

Messrs. Parry & Co., of Madras, have accepted the honorary appointment of Agents of the U. P. A. S. I., and the registered office of the Association has been transferred to their premises, North Beach, Madras.

The Bangalore office—25, South Parade—will continue to be the headquarters of the Association.

Labour Questions.

While in Madras the Hon'ble Mr. J. G. Hamilton discussed Labour questions with the Secretary to the Madras Landholders' Association, who expressed a desire to see the Books of Proceedings of the U. P. A. S. I. These were sent to him in due course. In acknowledging receipt of them he writes:—"The Madras Landholders' Association will be glad to co-operate with you in matters which affect the common interests of itself and your Association."

Planters will no doubt remember what Mr. M. E. Couchman observed at the last annual meeting regarding landholders and the Labour problem.

Arsikere-Mangalore Railway.

In continuation of letter dated the 27th September 1909 stating that the Government of India would be prepared to give their sympathetic consideration should any private company come forward with proposals to finance the construction of the Arsikere-Mangalore line, the Acting Secretary to the Government of Madras, P. W. D., writes, under date the 7th instant:—"I regret to have to inform you that the terms of the new contract to be entered into between the Secretary of State and the South Indian Railway Company contain certain provisions with regard to Railway Construction in Southern India which will preclude the Railway Board from giving their support to the construction of this line by a private Company.

"I am desirous to inform you without delay how matters stand so as to prevent as far as possible any misunderstanding and consequent disappointment to the members of your Association."

"Times of Ceylon" Christmas Number.

A copy of this excellent publication has been sent to this office for review. Its contents are very varied and include a large number of highly attractive illustrations as well as good stories and other literature of an interesting kind. Its popularity will certainly not wane so long as the publication maintains its present high standard, and the publishers deserve warm thanks for placing before the public a "hardy annual" that delights the eye in some new way year after year, and never fails to interest the brain also.

PLANTERS' PAPERS.

III—The Curing of Coffee.

A Résumé of an enquiry made after a great outcry from Home Brokers and Buyers in 1903 that the bulk of East Indian Coffee had deteriorated, and that marks were full of Pale Beans; undertaken by E. W. R. for the purpose of obtaining samples of his proprietor's coffee during preparation at Mangalore and thus discovering what influence, if any, the Coast Curing had on the colour of beans.

[The reader must understand that the writer when making the following notes was only investigating the general practice of curing in so far as it had any bearing upon the colour of the beans, and was not investigating a curer's work.]

SEASON 1903-04, ENQUIRY BEGUN 23RD JANUARY 1904.

My instructions were to take a certain number of samples from each Estate, and to closely watch the milling, and anything else of interest, especially with reference to the deterioration of colour in the beans during the process, taking the hand-rubbed samples sent from each Estate as a criterion, and thus to prove by:—

- (1) A sample taken on arrival in Mangalore—" *If coffee deteriorates on the way down.*"
- (2) A sample after drying—" *If the drying caused loss of colour.*"
- (3) After the coffee had been milled—" *If the mills did any harm.*"

(1.) *Does the colour deteriorate on the journey down up to the period of re-drying?* The answer to this question is in the negative, provided that the coffee is not kept long on the journey, or before re-drying, and is in the hands of a trustworthy cartman. Damp and fermentation, I think, are the only real things to fear. With regard to damp, if carts are badly covered they are likely to get their sacks wet from rain during the journey from Saklaspur to Mangalore, especially while passing along the sides of the river Goondya. The damp here from over-hanging bamboos and trees is great, especially in the early morning and at night (when carts, owing to the great heat during the day, generally travel). When I covered this road at 6-30 a.m. on January 23rd, 1904, it was just as if it had rained hard, and my bicycle had mud all over it, but after passing over 15 miles or so of the road, it was as dry as a bone, and the heat fearful, so even if sacks had got wet, they would dry again to the detriment of the parchment.

Other places where the sacks may get wet are at some of the rivers near Mangalore where the cartmen, to avoid paying ferry fees, cross through the water and so get the bottom sacks wet. If coffee is sent down very damp it ferments in the sacks.

While dealing with this part of the subject it may be as well to point out that the big towns outside Mangalore, such as Buntwal, and places where the carts generally stop before the final bit of journey, are noted for coffee stealing, and I think conviction would be more often secured if rewards were offered to the British Police. Any tampering is generally done about these places, especially if cartmen have badly sealed sacks, and know they have more Coffee than mentioned in the Pass, the deficiency being made up by watering the coffee.

On arrival in Mangalore, cartmen go straight to the works and deliver their Pass, and unless it is a Sunday or other coffee is blocking the way (which very seldom happens), they are allowed to unload at once, and place

their sacks in order, when they are counted and all the seals examined. If any sign of tampering is seen, these are pointed out to the cartman and the sacks put on one side. All being correct, cartmen must cut open their own sacks, and pour the coffee into bushels. As regards the Bushels, there are generally several in a row, and men belonging to the firm receive the coffee from the bushels into other sacks, (generally for convenience two bushels in each sack) and carry them away as they are filled. The striking of Bushels is done by special men; and writers stand at both ends (if several bushels are in a row) and see that striking is carried out correctly. Bushels are not jumped; if badly struck, or filled, they are turned out and re-filled.

Generally several sacks are checked to begin with to see if they have been filled properly (bushels and odd seers being taken); usually three sacks or so suffice.

During this period the weight is taken of some of the measured sacks, three or four being taken, or possibly as many as 10 or 20, according to the quantity of the consignment and state of dryness. This is to find the *average weight per bushel* on arrival, and this is entered. The Coffee is meanwhile being well examined in the cartman's sacks, and if part of the consignment is found damper than the rest it is generally kept separate. Then, when all has been measured in, the total is taken and, if correct, cartmen are given orders of payment and paid up as soon as possible. They generally leave the town after getting this done, as keeping carts in Mangalore is expensive.

We now have entered against the marks in the firm's books,—Way Bill No,—Estate name,—Bushels according to planter,—Bushels on arrival in Mangalore,—Date of despatch and receipt,...Average weight per bushel,—Condition.

The above are also entered on a card which is placed with the sacks in the godown. This card follows the coffee along till it is shipped, when it is filled. If one sees sacks in the Godown without a card, the card will be on the Peeler, and that lot of coffee will be in a further stage of preparation, and so on during the whole process. If the preparation advances one step, the card goes one step in front.

As regards—*the average weight per bushel on arrival, and condition* there is a good deal to be said.

There is not much doubt that *even and thoroughly dried* coffee is what is wanted for the *Edge Runner*. There seems to be a misunderstanding among Planters as to how far they should dry their coffee down, so that at present it is sent down at all weights, and thus is received in all conditions and with weights varying from those existing when it is removed from the Vats down to 28 lbs per bushel. When coffee is sent down at the higher weights it causes a lot of useless trouble to the Curers, and is very often fermenting in the bags. Coffee sent down too dry is almost as bad, as if cracked the inside beans will generally turn pale, if they have not already done so. Planters are some of them very careless when sending off parchment, and very often mix little lots in different states of dryness, and thus the whole consignment dries unevenly on the coast.

It struck me that parchment from Estates should arrive at the coast about 32 or 33 lbs. (one Curer advocates 31 lbs. as standard weight for a bold coffee, which would give him 1 to 1½ lbs. still to dry), and then the final drying is left to the Curer, who, granted that the consignment has been evenly dried to this weight, will then be able to finish off the drying process quickly; and I believe coffee dries more evenly on the coast and more quickly, the sun being more direct and thus fixing the colour better.

The re-drying at the Coast and whether it does harm.—Coffee, as pointed out above, arrives either wet, medium, or nearly dry, and by most firms is put on the drying ground as soon as practicable after its receipt, and then it can be stored while waiting its turn for the Peeler.

There is, I believe, a misconception among planters as to what colour is like when dried on the Coast, and so in experimenting they forget that as long as the bean has a percentage of moisture in it the colour is not fixed. This is the reason why some coffees hand-rubbed and afterwards sent home look so bad on arriving. As the London Market wants blue, but perfectly dry, coffee, the fact must not be overlooked that until the coffee is dry it is no use to talk of comparing hand-rubbed samples sent home from the Estate with those received after drying on the Coast. Colour may be well demonstrated by taking a child's slate and rubbing a moist rag over it. The colour when the slate is damp is very fine, but that is not the natural colour of the slate. Thus, a hand-rubbed sample on the Estate is very fine, but that is not the right colour of the coffee, which can only be obtained by removing the moisture, a process which sets the colour.

A bad coffee will never improve during the drying if it had a bad colour to begin with. Colour changes from a slate at Vat weight, going through different stages from bluish slate to blue at 35 lbs., when it begins to assume a mottled appearance and the colour gets blue-green to slaty-green when quite dry, and if not a good coffee to begin with assumes a tinge of pale grey. This brings us to

Drying proper.—The coffee is shot out on Barbecues; and left there for a time depending upon the weight on arrival. A damp coffee requires several days or hours to dry, while one nearly dry only needs a little time, such as being shot on a hot barbecue for $\frac{1}{4}$ or $\frac{1}{2}$ an hour. On the Barbecues coffee is watched very carefully, and continually turned over with rakes, till the weight of peeling is reached, and it is hard and crisp enough to mill. It struck me that this drying process also had the effect of crisping up the parchment skin, which on arrival, never mind how dry, is not as crisp as it comes off the barbecues on the Coast, and I believe that, if put into the peeler in this state, *i.e.*, as received from the Estates, the parchment and silver skin would be ingrained into the beans by friction.

I find that before drying when the thumb is pressed into the germ end of the bean it goes easily into the horny part of it, whereas just after drying the nail will only enter the part where the germ is, and not the horny part.

It seems that the bean has its colour quite fixed when the horny part is hardened and the germ destroyed by heat—*i.e.*, sunning. Another test is to put a bean between the teeth, when it should crack like a nut if dry. All coffees have a certain peeling weight, a heavy coffee will peel without hurt from 30 to 31 lbs, whereas a light coffee peeled at this weight would be spoilt in the mill; coffee can be peeled as damp as 36 lbs, but deteriorates rapidly soon afterwards owing to its still containing a lot of moisture. Some coffees dry as low as 28 lbs and are yet not overdried.

I believe that during the process of drying a period is reached when coffee is likely to be injured by slow drying on the Estates or the Coast, and its colour should be fixed by direct sun as quickly as possible.

One has only to watch the Curer during the process of re-drying to know that he attaches more importance to this than any other process, and he will tell you better results are obtainable if coffee is evenly dried, and neither under or over-dried. I believe when inside moisture is once driven out of the beans extra drying will only pale them; hence the Curer tries

just to hit off that period when all this moisture is gone, and he dries it no more after this.

As regards the proposed drying under mats, this is to be deprecated, as the bean is given unfair treatment; the sun rays not being direct it dries unevenly or mottled, especially under wide meshed mats. One has only to hold a mat up to the light to see the different rays of light and shade. This is certainly borne out by some coffee which I saw dried to peeling weight. This was of a better colour than the same coffee dried in the sun till it reached about 32 lbs, but after this the sun-dried parchment gave a better colour than the mat dried. I do not know what the result would have been if it had been dried under canvas or something equally closely woven.

Coffee sometimes dries in the Coast store, but the parchment is not then as crisp as if it had been dried in the sun. I believe that if coffee was dried down evenly to, say, 33 lbs. on the Estate, or any weight which would allow the Curer to do the slight finishing of drying on the coast it would have more chance of going into the peeler in an evenly dried state. One Curer pointed out to me that coffee dried too low on the Estate always pales when crisped up on the Coast, whereas if slight moisture is in it, it does not seem to bleach on re-drying. The best way would be for planters to have on the drying ground each lot marked at its different weights, and never mix lots of uneven weights. Small consignments of 5 or 10 tons sent off soon after Estate drying, and not kept up-country long, arrive in better condition than larger ones which have been kept so as to make up a big batch. One has only to see a big consignment arrive on the Coast, classified as dry at average weights of say 31 lbs.; if women were put on to pick over a certain portion, one would find they could get bushels at 33 and 29 lbs. odd, though the average would still be 31 lbs. *This is what Curers mean by uneven drying.*

Referring again to the weight of coffees at time of sending down, when coffee on an Estate is dried to weights of 30, 31, 31½ lbs., it is just in the stage when the majority is dry, *i.e.*, just in a sec-saw stage. The Curer, only having to deal with bulk, must risk a certain amount going into the Peeler damp, or else overdry it. I should not wonder if, judging from the prices of some coffee, it should not have all its moisture removed before milling; and if this makes the right stage of dryness, *viz.*, that at which it can get home without paling, and will not deteriorate if kept a short time before roasting. Still, as all grains which have to be kept are always, in a finished state, perfectly dry, and only harmed by further moisture, this fact of leaving moisture is very risky, especially as coffee may have to be bought in and kept. It is hard to say what is the true colour of the dried bean that is wanted as "Mysore" in London market, but I should think bluish green (not damp slate blue). If the damp slate blue colour could be retained it no doubt would be the one sought after. I should think the order of selling colours would be: 1. Bluish Green, 2. Greenish, 3. Slaty Green, 4. Greyish Green, 5. Greyish, 6. Pale in direct sunlight but grey in ordinary sunlight. There is also a brownish green, obtained by artificial drying, but I do not know how it would rank. It has one advantage of appearing perfectly even in colour. I cannot say No. 1 to 4 roast better than No. 5, but I should say that they would liquor better.

It is noteworthy that, as a rule, the line down the centre of the bean is nearly or quite straight in the bold coffees, but in others it is not so. The style, and colour, and shape, of bean generally run in the same lines. Bold fine, medium round, flat long bean, and peas have a straight line if amongst the colours No. 1 to 4, but not so if of the colour of No. 5 or No. 6; then the line is not straight, and the beans are slightly concave and malformed (Boat-shaped beans so called). This points to want of quality in the fruit.

Finally with regard to re-drying on the Coast one has only to refer to reports on samples sent home after this process has been carried out ; for example :—

1. *Re sample of coffee which had been dried 5 hours.*

"The sample of coffee taken on arrival on the Coast when compared with the sample taken after the coffee had been dried 5 hours proves that drying did no harm ; both these samples being identical."

2. "One point is indisputably established, and that is, Coffee in Parchment dried down thoroughly, and evenly, on the Estate in no way suffers from a few days' detention on the Coast, and subsequent sunning to make the bean ready for milling."

3. "The samples sent home so far clearly prove that a few days' detention on the Coast, and some re-drying before being milled, does not deteriorate the colour at all."

This brings us to the subject of *Treatment after drying.*

Coffee is now stored *pro tem*, and by samples I tried, there did not seem to be any loss of colour, even if kept for some time in the store. After drying the weight per bushel is again taken. Most Curers say that at this stage, *i.e.*, after sunning, the coffee should be allowed to cool well, as if milled at once it will lose colour by heating in the Peeler.

The card is now entered up to the state when the coffee is dry. It is next, when its turn arrives, put on the side of the Peeler, and at this period the coffee, so far as we have noticed, has only undergone the natural change of colour by drying, and this colour is fixed, or ought to be.

(*To be continued.*)

TEA AND COFFEE IN NYASALAND.

The Financier, quoting a report issued by the Colonial Office, says :—

Coffee is a very speculative crop in Nyasaland, and is being gradually discarded in favour of cotton and tobacco. The total acreage of the year under review was 6,037, of which only 3,957 acres were carrying crop, the remainder consisting of old and partially-abandoned gardens. The export for the past year amounted to 748,410 lbs., being a reduction of nearly 187,000 lbs., on the previous season.

The tea crop, although very promising, will necessarily remain of minor importance among the agricultural products of Nyasaland owing to the fact that the particular climate suitable to its needs occurs over but a limited area within the Protectorate. On the southern slopes of Mlanji mountain, however, where the rainfall varies from 70 to 90 inches per annum, there are at least 20,000 acres well adapted for tea, and the experimental plantations in the neighbourhood, which for some years attracted little attention, have now achieved very satisfactory results. The area under this crop has increased to about a thousand acres, more than half having been planted last season. It is questionable whether the yield from these estates will be so heavy as on the best Ceylon plantations, but the quality of the tea is superior to the low country Ceylon, and fetched prices last year varying from 5*d.* to 7*d.* per lb. in London.

The locality where tea is grown is within 20 miles of the Shiré Highlands Railway, and there is every reason to believe that the industry will prove a very profitable one. The exports of last year amounted to 36,281 lbs. being an increase of some 12,000 lbs. on the previous year.

DISTRICT PLANTERS' ASSOCIATIONS.**South Travancore Planters' Association.***Minutes of Meeting held at Quilon on November 26th, 1910.*

PRESENT :—Mr. D. G. Cameron (Chairman), Messrs. J. C. Parker, W. E. Bownass, S. W. Sinclair, A. W. Leslie, J. B. Cook, P. W. Keir, H. W. Heberden, W. Ingram and L. G. Knight (Honorary Secretary.)

By proxy :—Mr. J. S. Valentine. **Visitors :—**Messrs. T. Cameron and W. Clare.

Proposed Game Rules.—These were read and considered.

Resolved : "That a Committee be appointed to go into the matter to draw up a reply to Government, and that copies of the reply be sent to other Travancore Associations, and that the Committee consist of Messrs. D. G. Cameron, H. W. Heberden, and L. G. Knight."

Scientific Officer Fund.—With regard to the resolution passed by this Association at the last Meeting threatening to withdraw subscriptions, full explanations having been exchanged with the executive of the U. P. A. S. I. it was resolved: "That the resolution reading 'unless the Scientific Officer fulfills his engagement to South Travancore, all subscriptions from the South Travancore Association will be withdrawn' be withdrawn in view of the Secretary, U. P. A. S. I.'s letter of November 21st, 1910, explaining the reasons for Mr. Anstead's failure to fulfill his engagement, and also resolved that Mr. Anstead be invited to visit this district in April or May and stay a fortnight if possible in the Kalthuritty Valley."

Scientific Officer's Laboratory.—Resolved "That the subscription of 6 pies per acre to the Sc. O. Laboratory be paid."

The North Mysore resolution asking for a subscription of 4 annas per acre to the U. P. A. S. I. from all district Associations. Proposed by Mr. J. C. Parker and seconded by Mr. D. G. Cameron :

"That this Association, having carefully considered Mr. Browne's very able speech, are of opinion that the matter is deserving of support, but that before taking action a definite proposal should emanate from the U. P. A. S. I. showing what funds would be required."

Sri Mulam Popular Assembly.—Proposed and carried unanimously:—"That Mr. D. G. Cameron be our representative, and that the following subjects be brought forward by him :—

The Proposed Game Laws.

European Ward at the Quilon Hospital.

The C. T. P. A.'s suggestion that a Planting Agent be appointed in Trivandrum—Resolved: "That a Planters' Agent in Trivandrum is not considered necessary at present."

The Government Proclamation raising the assessment on lands was noted.

Rubber Exhibition.—Resolved: "That the meeting consider this Association should subscribe at the rate of 4 annas per acre and that Estates be invited to subscribe at this rate."

The Chairman called attention to Mr. Parker's impending departure from the district and wished to thank him for the services he has rendered to this Association from time to time, and also wished him success in his new billet.

(Signed) L. G. KNIGHT,

Hon. Secretary.

INDIAN TEA ASSOCIATION, CALCUTTA.**The Scientific Department.**

Circular No. 43, dated 28th November 1910, reads as follows :—

I am directed by the General Committee of the Indian Tea Association to invite attention to the following notes in connection with the Scientific Department.

2. The field experiments at the Heeleaka Experimental Station in Assam were discontinued at the beginning of the present year owing to difficulties in obtaining an adequate supply of labour.

3. The Sibsagar District of Assam was originally chosen as a suitable locality for experimental garden work on account of its being the most central of the North East India Tea Districts and because the soil and climate are both typical of a large number of tea gardens. The opening of the Gauhati extension of the Eastern Bengal State Railway and the accelerated service on the Gauhati-Lumding branch of the Assam-Bengal Railway brings this District into still closer touch with the Dooars, Darjeeling and Terai. Experience has shown that this choice of a district was a wise one, for the results of the experiments carried out at Heeleaka have proved to be applicable to many districts. It seemed desirable, therefore, on many grounds, that the work of the Scientific Department, whether it includes direct control of field experiments or not, should be continued in so suitable a district, and it was with this in mind that the Committee of the Association approached the Jorhat Tea Co., one of whose gardens is situated near the present Experimental Station, and within a short distance of Heeleaka Station, on the Assam-Bengal Railway, with the object of acquiring a suitable site for a new experimental station; but negotiations with this Company have unfortunately fallen through.

4. The present seems, therefore, a fitting opportunity to consider whether a new area of tea for experiment should be acquired or whether it would be more profitable to supplement the work which has already been carried out by a series of experiments on a large scale under the control of garden Managers, with the advice and co-operation of the officers of the Department. The latter alternative appears to offer several advantages. It would give more time for manufacturing experiments and travelling than has hitherto been possible, and would permit of laboratory work of various kinds which has been to some extent handicapped by the routine work of plot experiments.

5. It would also be desirable at this juncture to consider whether the officers of the Department should be located at one central station. The advantages of this plan are obvious. The existing arrangement whereby the officers are situated in widely separated districts was admirably adapted to the conditions of the pioneer work which was necessary when the Department was first founded, but at the present time it has several drawbacks. Mutual help and exchange of opinion between the officers of the Department is reduced to a minimum, and the time occupied in travelling to the various centres of work is considerable. At a central station each officer would be in touch with the work of the others, and the absence of one of them would not necessitate the temporary cessation of his work or its relegation to his subordinate staff.

6. An expression of opinion on these questions is solicited in anticipation of a meeting (which will take place in January on the occasion of the next meeting of the Tea Cess Committee) at which the programme of the Scientific Department for the coming year will be discussed.

7. The favour of an early reply will much oblige.

(Signed) H. M. HAYWOOD, *Secretary.*

CORRESPONDENCE.

"Quality of Coffee & Liqueuring."

Dear Sir,—In reading Scientific Notes, by our energetic Scientific Officer, in your *Chronicle* of 26th ultimo I note under the above heading a remark made by Mr. Farrar "That somewhere somehow in cultivation lies the difference between quality and want of quality, it may be more sunshine more or different kinds of manure, etc." Is it possible, that he has hit the right nail on the head, when he mentions "Sunshine?" I think most planters will agree with me, that, for the last ten years or more, coffee has been grown under considerably more dense shade than before that period.

Why does Ceylon coffee still fetch such good prices, is it now grown under shade or not? If not, is it not possible that may account for it still keeping its quality? I would suggest that those planters who have made clearings adjoining old coffee, (within the last 3 or 4 years) and thereby letting in light and sunshine on the old coffee, should pick and cure separately a small sample from those trees that have had the extra light and send it home, to be tested for quality and liqueuring.

If three or four estates could do this, it would give us some idea, as to whether dense shade had anything to do with deterioration; of course we cannot do without shade, but probably could do with it much lighter than at present on most estates.

"CATCHING AT STRAWS."

Germination of Manihot Rubber Seeds.

Sir,—Will you or any of your valuable journal readers inform in your valuable mirror of journal if the following method will germinate Manihot Rubber Seeds?

C. M. A.

By placing a layer of fresh horse manure in a box to the thickness of about six inches spreading the seeds on the surface and cover with about one inch of the same material mixed with a small quantity of sand by packing the soil lightly and the box covered with glass to put in a warm place or in the sun.

Tapping Ceara Rubber.

Dear Sir,—In Vol. V, No. 37, of *P.C.*, Page 483 "Mr. W. Wicherley, F.R.H.S. the well known Ceara Rubber expert," says:—On no pretence whatever should the Ceara Rubber Tree be stripped of its bark without also being subjected to tapping.

In Vol. V, No. 42, Page 552, Mr. Anstead says:—

"Before tapping commences the outer bark should be removed, and this should be done 3 week to a month before any tapping is done, to allow the inner bark to harden. In some places as much as 3 months is needed, etc."

I should be very much obliged if you would show this to Mr. Anstead [*Note by the Scientific Officer.*—I do not agree with Mr. Russell that these two statements are totally different. Mr. Wicherley, I take it, means that the Ceara is not to be stripped of its outer bark unless and until it is to be tapped, that is not out of curiosity or a mistaken notion that such stripping will increase the growth in girth. The stripping must be done some little time before tapping is begun, because the exposed bark is so soft that in practice it is found that the knife drags and tears it instead of cutting it and it must be allowed to harden sufficiently to allow of easy paring or cutting. The time required for this differs from two weeks to three months in different districts, depending upon climatic conditions. My statement is thus merely a continuation of that of Mr. Wicherley.—R. D. A.]

COFFEE.**Short Supplies.**

At the beginning of last month Messrs. Willett and Gray, of New York, reviewing the Coffee situation, remarked :—

Attention was called last week to the extremely small amount of Brazil coffee actually available to the trade in the seaports here. The figures of November 1 show that New York had only 800,000 bags, New Orleans 100,000 bags, while the afloats from Brazil to the States were only 378,000 bags, altogether out of proportion to the deliveries as they relate to consumption.

Reliable advices from some of the close observers of the coffee markets in Europe tell of practically the same conditions existing there, that the trade generally in the seaports and in the interior are drawing to an end of their supplies. Instead of having good working stocks, indispensable for business at this time of the season when Brazil has sent down 65 to 70 per cent. of the current crop, the port stocks in Europe of all kinds are only 7,850,000 bags. Out of these 7,850,000 bags now existing there the San Paulo Government bonded coffee is 4,840,000 bags, say five-eighths of the total, and of the Government coffee only a moderate quantity can be sold each year January to June. With average monthly consumption in Europe of all kinds of coffee, say 900,000 bags, the available spot stocks of only 3,000,000 bags are just as conspicuously out of proportion as the stocks available to the trade in this country. The Brazil afloats to Europe are only 590,000 bags.

While the foregoing cites the poorest condition of actual available supplies on spot or under way to consuming markets, it points more strongly to the absolute necessity for constant new purchases in Brazil, a necessity which is recognized and understood equally as well by the holders in Brazil as by the trade in Europe and America. In fact, it has been emphasized in the most pronounced manner by consuming markets constantly making strenuous efforts to obstruct a legitimate advance which Brazil, owing to her small crop this season, is thoroughly entitled to. This phase of the matter has influenced financial interests in Brazil in sympathy with the holders of Coffee, and money has been readily forthcoming at easy rates to facilitate the holders in carrying the Coffee, and while all commercial interests should naturally appreciate regular trading on a basis justified by supply and demand, there will be less sympathy for consuming markets when attempting to provide themselves with new stocks in Brazil because of the prolonged obstinate fight which consuming markets have waged against the holders in Brazil to break the Santos market for the purpose of buying.

Within a short time the new Federal Government in Rio will have before it the consideration of fixing a new rate of exchange. The recent sharp fluctuations in exchange rates give some idea of the difference of opinion what figure should be established. There are just as strong adherents to the proposal of 18 pence as there are to that of 16 pence. Whichever figure is adopted the regular routine of the business will produce rates for actual trading presumably somewhere between the two, and whatever that is, it seems absolutely certain that it will not influence the cost and freight price of coffee from a legitimate basis, according to the actual position.

Under section 4 of the Madras Planters' Labour Act, 1903, the Governor in Council is pleased to authorize Mr. W. A. Fleury, Chundale Estate, Vayitri, Málabar, to witness the execution of labour contracts.

RUBBER.

Disinfection of Rubber Seeds.

The question of the possibility of introduction of the spores or mycelium of the various fungi attacking Pará rubber on the seeds of the rubber tree has been the subject of much discussion at the *Chambre d'Agriculture de la Cochinchine* at Saigon, and the subject of disinfection by chemicals was discussed.

The smooth seed of the Pará rubber, I do not think, could retain spores, but should there be any fragment of soil attached to them spores could be carried, the subsequent washing or soaking in water that seeds should receive on arrival from some distance to facilitate their germination should however remove any possible risk.

M. Morange thinks that there is always a risk in seeds picked up and not disinfected, and as to mycelium he urges that if seeds of Pará rubber are piled in a heap and left they grow mouldy and this mould is a mycelium growing on the seeds.

Pará rubber seeds, if left in a pile become heated very quickly, in fact commence a chemical decomposition, the polished surface of the seed is rapidly destroyed and the thin outer layers broken up so that the mould can then attack the seed. But it is not assumed that rotten seed is imported and carefully planted by a rational planter. Would a planter sow a *Hevea* seed covered with a very conspicuous mycelium of *Fomes*? and should a fragment of mycelium of *Fomes* be buried with the seed what are the chances of its being planted in actual contact with dying shrub or tree on which it could continue to develop? Besides, even supposing the seed had not been exposed to the light and heat of the sun which in a few minutes would certainly kill the mycelium, the chances of survival of the mycelium threads are very small indeed.

A fungus to establish itself requires a good deal more than importation of one or two spores, or a scrap of mycelium. It requires to be brought and put in such a position that it can actual then and there continue its growth luxuriantly, the actual chance of this in most cases is extremely small, otherwise we should utterly fail to keep out any fungus that happened to be suited for growth on any particular crop.

Fungus spores can be borne by the wind to any distance and doubtless are, but wide as the distribution of these air-borne cellular plants is, many quite fail to effect a settlement in many places. Nothing that man can do can prevent this method of invasion. What we can do is to prevent infected, that is diseased plants, from being brought in and planted among healthy ones of the same kind.

Fomes semitostus is not yet recorded for Cochinchina, but the mycology of that country is quite unknown at present and it may be there all the while. However, the agriculturists of Cochinchina are taking care not to let it or any other fungus-pests be imported, which is prudent. For this object the importation of *Hevea* plants is strictly forbidden and the seeds must be disinfected with Bordeaux mixture or some such disinfectant. One planter having alleged that such disinfection would kill the seed, M. Morange made a series of experiments with bichloride of mercury, and copper sulphate, with the following result :—

1. Bichloride of Mercury 1 per 1000.				
A. Seeds washed after treatment—Proportion of seeds which				
	germinated after 30 days	...	...	70%
B. Seeds not washed				
		...	...	68%
2. Bichloride 2 per 1000				
	washed	...	...	84%
	not washed	...	...	90%
3. Sulphate of copper 1 per cent.				
	washed	...	...	62%
	not washed	...	...	52%
4. Sulphate of copper 5 per cent.				
	washed	...	...	68%
	not washed	...	...	62%

Check experiment, Seeds washed in pure water gave 78, and 70% germinated after 30 days.

The seeds were put in the disinfectant for half an hour.

Except in one case there is a slight proportion of larger germination in the washed over the unwashed seeds, and there is a fall off in germination in the seeds treated with copper sulphate, but not a very large one compared with the check experiments.

Another experiment was made by M. Belland—400 seeds were plunged in water and left for half an hour; all germinated.

500 were put in solution of one per cent. of copper sulphate for half an hour and continuously stirred round (*brassées*) energetically for half an hour.

Of these 38 only germinated.

M. Morange made also an experiment of the same nature.

Five hundred seeds were sown dry without washing, and 285, *i.e.*, 56·8 per cent., germinated in a month.

Another lot were stirred in plain water more carefully, of these 213, or 42·6 per cent., germinated.

Another lot were stirred in copper sulphate solution 2 per cent., and 291, or 58·2 per cent., germinated.

A fourth lot were stirred in Bichloride of Mercury at 2 per 1,000, of these 285, or 59 per cent., grew.

It is clear from these experiments that stirring the seeds round in the liquid, whether water or copper sulphate solution, is extremely injurious.

The best disinfectant results as far as germination is concerned appear to be from the use of bichloride of mercury in weak solution, and washing afterwards without stirring the seeds round.

This solution might, however, not be strong enough to thoroughly disinfect the seeds, assuming they were covered with spores.

Personally I think the risk of importing seeds with spores of rubber-killing fungi is infinitesimal. Supposing for instance one rubbed a seed with spores of *Fomes* and planted it in the nursery. The Spores would not last indefinitely and it would be probably two years before the plants in the nursery would be old enough to be attacked. It is in the highest degree improbable that any of the spores would germinate at all under the circumstances. In the case of *Diplodia* the risk would be still smaller, as *Diplodia* requires to be put on the cut end of a shoot to make a successful growth. As I have pointed out, till decomposition of the exterior of the shell of the seeds sets in the spores could hardly rest on the smooth surface, and would, even if attached by mud, etc., or included in the packing, be washed away by ordinary plunging in water and probably by the first rain also.

The case is quite different with stumps or plantlets infected being brought into the estate. Here the fungus is established in a thriving state on the young plant, and can go on developing there. It is put in contact with healthy plants in the same condition of life perhaps even thumb-nail pruned or with buds wounded in some way. By planting infected spore-producing plants in such a healthy lot, a plant would be putting the fungus in the best possible position for its development.

The fungi belonging to the group *Polyphorei* are extremely abundant all over the tropics, and it is very unlikely that *Fomes semitostus* is the only one that can adapt itself to attack Pará rubber. Indeed we know that *Irpex flavus* which used to give trouble with coffee can attack Pará rubber. Tubenf records thirty species of *Polyphorei* as fatally attacking trees in Europe and North America in the same way as *Fomes* has taken to attacking Hevea, and as far as one can see any at least of the larger *Polyphorei* in the Tropics could adapt themselves to attack Hevea. In Christmas Island I and others collected eleven species of *Polyphorei*, and there are probably more to be found in wetter seasons. How did these get to this isolated island? Some at least by spores blown for 250 miles from the nearest land, but a number of the wood-destroying fungi were undoubtedly brought in planks, poles, firewood, old boxes, etc. It is absolutely impossible to prevent this. A bit of firewood on arrival at the port is found to be rotten, *ie.*, it contains mycelium. It is naturally thrown away, the mycelium continues to grow, and produces its sporophores. Other rotting timber is lying round, its spores attack that, and the fungus is established. We cannot stop this, but we can prevent the introduction of plants infected by a fungus which has adapted itself so as to be parasitic on any plant we are cultivating, and its being put in contact with other healthy plants of the same, and this is, or should be, the object aimed at by all legislation against the introduction of fungus pests.

One of the difficulties in carrying out the disinfection laws of the various countries seems to be due to the smallness or incompetence of the staff. A case of plants sent from Singapore to an island where the laws were stringent was entirely destroyed by the disinfecting process, entailing a great loss on the importer. Another planter complains that the delay in disinfecting and inspecting is so great that the plants are half dead when they arrive at his estate. In some countries formerly, at least, no plants of any kind were allowed to be imported, preventing thereby any progress in agriculture at all. It should not be difficult to prevent the importation of sick plants without discouraging the importer of new strains or new species of useful plants which may be of the greatest value in the future to his country. At the same time in the case of any disease of a cultivated plant appearing it should be possible and compulsory for the planter to report to a scientific staff who could take steps to prevent the disease increasing or being spread by sending infected plants from one estate to another. As so many of our plant diseases are of local origin I hold this system to be actually of more importance than preventing accidental introduction of the pest from outside, which is none the less a point not to be lost sight of.—*Agricultural Bulletin of the Straits and Federated Malay States.*

In Brazil.

A British Consular Report on the Trade of Brazil for the year 1909 states:—

Rubber.—1908, a year of depression in the rubber trade of Brazil, was followed by a year in which prices rose to a level which had never before been attained, the value of the rubber exports in 1909 being £18,926,061, as compared with £11,784,637 in 1908 and £13,594,018 in 1907.

The increase in the quantity exported, however, in no way corresponds with this large increase in the value of exports, and were it not for the greater exports of lower-graded rubbers, chiefly Manicoba, the amount of rubber sent by Brazil to the world's markets would have been actually less in 1909 than in the two previous years. Exports of Pará rubber, almost entirely composed of the wild rubber from the forests of the Amazon basin, fell off in 1909 in spite of the frenzied demand for rubber from so many branches of trade, the orders of the United States automobile industry especially being unprecedented; and so great is the difficulty in obtaining labour to collect the wild rubber in Amazonas and Acre, that the rubber extractors in the limitless forests did not furnish a larger quatum during the past year than in those years when the world's consumption was less.

The extent of the natural rubber forests of the Amazon valley, a vast zone of 1,000,000 square miles producing the finest Pará rubber, is still unknown, and perhaps only a fraction of these forests has been exploited and scarcely more explored. Each year some fresh stream or tributary is discovered whose banks are profusely covered with Hevea trees, the most important discoveries in 1909 being those in the valley of the Xingu River. Away from the streams which constitute the natural means of approach there are still vast tracts of forests about whose commercial possibilities no clear estimate has been or can be made. Although it might seem that their output could be made to vary with the demands of the rubber industries, it is the case that the better the conditions are for wild rubber the worse they are for human habitation, and so dense are the forests, so damp their climate, and the means of reaching them so difficult that large plantations of rubber trees are being made in Brazil in regions easier of access and, in proportion to the amount of capital invested in exploiting wild rubber forests, a considerable amount is being invested in Brazilian plantations.

Though no plantations of Hevea to any important extent have as yet been recorded from the Amazon Valley, where Federal and State Governments alike encourage plantations, in the States of Parahyba, Ceará, and Bahia rubber trees were planted, largely Manicoba and Jecquie. In those States Manicoba and Mangabeira grow wild in some abundance.

Manicoba and Mangabeira rubbers are priced some 40 or 50 per cent. lower than the Pará rubber. When prices become permanently lower, as would seem inevitable in view of the threatened competitions of the Asiatic plantations, the Brazilian exports of these two varieties will suffer severely owing to their high cost of production and the scarcity, as well as high cost of labour in Ceará and Bahia and the high taxation of agricultural products. Jecquie rubber, which like the two kinds mentioned above, is grown largely in the State of Bahia, brings almost as good a price as Pará rubber, and from 600 to 1,000 trees can be planted to an acre, as compared with 150 of the Pará variety. They require only five years to be ready for tapping—some two years less than the Pará tree.

The initiative in any reform for protecting the trees and for improving the methods of preparing the rubber for delivery—a reform which is called for throughout the rubber zone of Brazil—is more likely to proceed from the Federal Ministry of Agriculture, which has a department to control the rubber industry in the Federal territory of the Acre, than from the Governments of the States concerned. Owing to the defective methods of tapping and coagulating in Brazil, only 45 per cent. of the rubber collected is "fine" rubber. During 1909, a process was invented by Dr. Pinto for preparing crude rubber, and to test the value of this preparation, a ton of hevea and a ton of caucho prepared by this system are to be sold on the open

market in New York. Dr. Pinto received a premium of £2,500 from the Federal Government for his invention.

The Brazilian Government favours measures to encourage the plantation of hevea on a large scale, and the Governor of Pará has also recommended measures to stimulate plantations, but little seems to have been done in the way of protecting the forests from which the States of Pará and Amazonas draw some 70 per cent. of their revenues. The export taxes on rubber from Ceará and Bahia are less than those of Pará, but it is feared that those of Bahia will be very greatly increased. A rubber factory is to be established in Bahia.

The difficulty of supervising rubber estates is general throughout Brazil, though the plantations do not suffer in the same way as the forests do.

In August 1909, a congress of Proprietors of rubber estates was held in the Acre territory to discuss the best means of maintaining prices and developing the rubber industry. The message which, on the conclusion of their sittings, they forwarded to the President of the Republic, states the chief difficulties under which the rubber industry labours not only in the Acre but throughout the Republic.

The remedies they propose fall roughly under the following heads :—

Legislation to confirm actual proprietors of estates in their possession.

Communications. Roads (especially in Alto Purus and Alto Yaco to connect the estates).

Railway (from frontier of Peru to Bocca do Acre).

Steamships, subventions to.

Colonisation, further Government aids to.

Commission to study rubber plantations in Ceylon, etc.

Taxation, reduction of, especially of export taxes.

The state of Amazonas which, being an agricultural state, is suffering from the gradual rise in exchange and the gradual increase of tariff duties, addressed a petition to the Federal Government, pointing to the alarming increase of duties on articles of prime necessity, such as rice, potatoes, beans, dried meat and clothes, the prices of clothes of the simplest description having risen some 50 per cent. in the last 10 years. . . .

The term "rubber" includes Pará rubber, "wild" or "Plantation," a product containing qualities which may perhaps never be exactly reproduced in rubber in any other country or climate than that of the partly submerged Amazon forest. It also includes Manicoba and Mangaberia and other low-priced rubber, poor substitutes for Pará rubber, and for which no special use has been found. Meanwhile a great increase of raw material is in sight, and some 626,000 acres planted with over 21,000,000 of trees in Malaya and Ceylon are coming into bearing.

From some estates and plantations in Brazil rubber may still be profitably exported owing to its special qualities, but from others the quality of the rubber is such, that, given the scarcity of labour and the heavy working expenses in Brazil, high taxation, etc., it cannot be profitably exported when prices fall to meet the Asiatic competition or to enable demand to keep pace with the already swelling production.

Rubber Culture in Asia.

One rapid rise of the Far East as an important factor in the production of rubber is demonstrated in a report on the situation by the American Consul-General James T. Du Bois, of Singapore. The following gives the salient parts of the report :

The total area devoted to Pará rubber plants at the end of 1909 was as follows: Federated Malay States, 178,668 acres; Straits Settlements and Kedah, 41,405 acres; Johore, 28,883 acres; Kelantan, 4,111 acres; making a total of 253,067 acres, upon which about 40,000,000 of trees are planted. The total number of estates in the Federated Malay States was 377, with an acreage of 500,431. The total number of estates in the whole of Malaysia is 534, with an acreage of 855,992. The total rubber produced in 1909 was 6,741,509 pounds, an increase of about 100 per cent. over 1909. These are the official returns, it is believed the actual output was probably much higher.

In the Federated Malay States rubber estate laborers numbered 77,525 in 1909, while the total number of such laborers in all Malaysia was 110,213. There were no serious diseases on the rubber estates in 1909. Root diseases seem the most stubborn, but planters are alive to their dangerous and insidious character. A fungus disease attacking the branch and stem of trees appeared on some estates, but prompt measures overcame it. White ants still give some trouble, but are considered no longer a serious pest. Catch crops are still little in favor. In the Federated Malay States less than 10 per cent. of rubber is interplanted with catch crops, while in the Straits Settlements it amounts to 40 per cent.

The business of plantation rubber growing has become the prime factor in the agricultural life of the Malay Peninsula and naturally the Agri-Horticultural Show held at Singapore in August, 1910, made rubber its principal feature. Several buildings were devoted to the display of rubber and rubber machinery, and great interest was taken in this part of the exposition. The progress of rubber culture in Malaysia is remarkable. Six years ago only 13,867 pounds of rubber were exported. Last year the export had increased to 6,741,509 pounds, valued at \$10,112,263 gold, and it is believed that the planters have only started in a great rubber era. Since 1902 there has been an upward movement in the price. It was 72 cents a pound in 1902, \$1'38 in 1907; while in May 1910 it reached \$2'88 a pound. As the average cost is about 30 cents a pound to produce and market the enormous profit, under proper management, is apparent. The probable 45,000,000 "tappable" rubber trees in Malaysia by 1915 should give a minimum yield of 90,000,000 pounds, which at \$1'50 would yield \$135,000,000 gross on an invested capital of about \$130,000,000.

Being in the rubber belt the southern islands of the Philippines should be excellent for the industry, and it is predicted that some day great and prosperous rubber estates will be established upon them.

At a time when the stage centre of the industrial world is so prominently and continuously occupied by rubber, for the exploitation of which perhaps no period in the world's history has equalled this in the numbers of syndicates formed and financed, excepting perhaps that of the well remembered "South Sea Bubble," it will naturally be of interest to examine into the possibilities of the cultivation and production of that product in a country immediately contiguous to the Federated Malay States, where some of the best plantations of the world are now to be found.

The Planters' Chronicle.

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THE U. P. A. S. I.

(INCORPORATED.)

The Scientific Officer.

Mr. Anstead returned to head-quarters on Tuesday night, after a short tour in South Mysore. He delivered an address at Saklaspur on the 10th instant before a special meeting of the South Mysore Planters' Association, at which there was a large attendance. His report will be published later.

His next tour is likely to be one to the Anamalais in January; but possibly, he will first proceed to the Nilgiris to inspect and give his opinion as to the suitability of a site that is understood to have been provisionally selected for the establishment of an experimental plot for the study of Coffee hybridisation.

Coffee Seeds.

A supplementary order for seed of *C. stenophylla* and *C. congensis* var. *chaloti* was despatched to Europe on the 15th instant.

"Grenier's Rubber Annual."

In a recent review of a copy of *Grenier's Rubber Journal* mention was made of a coming *Rubber Annual* to be issued by the same enterprising firm that publishes the monthly magazine. A copy of the Annual has been sent to this office. Its contents, illustrations and general appearance more than fulfil the promise given by the proprietors some time ago. Various subjects are touched upon; and some excellent pictures are given, including such items as Pará Seed germinated (life size) showing roots and base of stem; rubber of different ages on several estates; rubber tapping; teaching coolies to tap; crêpe rubber in drying shed, &c. The financial aspect of the rubber industry is discussed by several writers. Brief histories of the progress of the Bukit Rajah Rubber Co., and the Sungei Buloh Rubber Co., are given, and other companies come in also for special mention. The subject of "Artificial Rubber" is not overlooked. "A Visit to Vallambrosa" is recorded, and "The Menace of Vine and Wild Rubber Concerns" is taken into consideration. Mr. H. Hamel Smith, the Editor of *Tropical Life* (London) writes of "Rubber Production Fifty Years Hence," and comes back to the present time in interesting references to tapping, "pricking," and other matters.

Briefly, the whole annual is good, and it gives excellent value (as a rubber venture should do) for its cost, Rs.2.

Copies can be had at that price from Messrs. Charles Grenier & Sons, Kuala Lumpur, Selangor, F. M. S.

PLANTERS' PAPERS.

III—The Curing of Coffee.

A Résumé of an enquiry made after a great outcry from Home Brokers and Buyers in 1903 that the bulk of East Indian Coffee had deteriorated, and that marks were full of Pale Beans; undertaken by E. W. R. for the purpose of obtaining samples of his proprietor's coffee during preparation at Mangalore and thus discovering what influence, if any, the Coast Curing had on the colour of beans.

[The reader must understand that the writer when making the following notes was only investigating the general practice of curing in so far as it had any bearing upon the colour of the beans, and was not investigating a curer's work.]

SEASON 1903-04, ENQUIRY BEGUN 23RD JANUARY 1904.

[Continued.]

Our next question is, *Does the colour change, or deteriorate in the milling?*

One must here first describe the Mills at present in use on the Coast—*i.e.*, the *Smout* and *Edge Runner*. The former can be dismissed with a very few words, as it has gone out of use. It is only used now for cherry coffee, and occasionally to polish up very coated or foxy beans.

It requires more power to work than the *Edge Runner* which is now in use, and it is said to injure the outside of the beans so that the colour does not keep in England.

The Edge Runner Peeler.

This consists of a circular trough ridged down the sides and with two Rollers, or Peeling wheels, ridged up the side of the wheels, and over the face. The wheels are swung on a cross beam which revolves, and as the parchment coffee in the trough meets the peeling wheels it causes them also to rotate. There are also two sweepers, which are behind the wheels, and these when the coffee is peeled and the rollers lifted sweep the beans out of the trough into the peeling pit, whence they are carried to the winnower and sizer.

Some Peelers are fitted in addition with an Exhaust Fan, which helps to carry off dust. The trough, when full, contains from 18 to 20 bushels of coffee, which is shot into it from a hopper at the side. The time taken to peel a fill is about ten minutes. The rollers are set at a certain height off the bottom of the trough, and I should not at all wonder if the height they are swung off the bottom has a great deal to do with any heating, or extra friction, and if the friction obtained is not a proportional function of the number of the revolutions per minute of the rollers and the height at which they are swung above the bottom of the trough. Coffee to go into the Peeler ought to be perfectly and evenly dried to get the best results; in fact, stone dry. If damp, *i.e.*, containing moisture, it will deteriorate after milling. As the mills already cause a certain amount of damage to the dried coffee, this damage would be nearly doubled if moisture is left in the beans, as the friction is greater on a moist surface. I am not at all certain that on damp coffee the outer horny part is not injured by dust of parchment being rubbed in. As all coffee deteriorates in the Mills, it looks as if it had a good deal to do with it; and the friction being greater on a moist surface the damage is greater if the percentage of unevenly dried berries is great. The dried coffee is let into the trough from hoppers. The cross beam with rollers is already going

round, but the wheels are not revolving on their own axis, but as the wheels meet the Parchment they begin to revolve, travelling round the trough at about 18 revolutions to the minute. After a few revolutions the trough is filled with a regular composition of Parchment and silver skin which acts as a kind of cushion and should protect the beans from any harm, but if the parchment has not been crisped up by re-drying it is not reduced to fineness, and a dirty Parchment (*i.e.*, badly washed or otherwise) will, it struck me, never mind how carefully the Peeler is run, cause the beans to get discoloured during peeling. Some firms make a point of removing by sieves, etc., as much dirt and dust as possible before peeling. But this cannot be done to any practical extent if the coffee was badly washed, as the dirt in this case has stuck to glucose. All curers will tell you that Parchment off the barbecues, and in sacks, collects rubbish, which if allowed to pass along with the coffee into the peeler gets rubbed into the surface of the beans, whereby the colour and appearance of the beans are deteriorated. I saw removed, after drying, from some Parchment which was damp when put in sacks, about 2 lbs in the 18 bushels of fluff of the side of the sacks, though to look at the parchment one would not have realised it was there.

As the beans in the trough only cause the rollers to rotate, the outside parchment is removed by friction, in my opinion, and not by pressure.

Pressure is generally equal in all directions, but owing to the energy of rotation the Peeling wheels come under a force of resistance having no relation to the magnitude of the surface. Friction is greatest with soft, and least with hard, substances, so this means that if the coffee is not absolutely dry the damp beans will cause more friction and thus will have colouring matter driven out of them, or dust of Parchment and silver skin rubbed into them. A faint white line after milling round the edge of the bean will show a defect in the setting of the peeler (*i.e.*, whether it is heating or working too fast) or else that the coffee was not in a dry state when put into the trough. Beans thus marked almost always turn pale, and this is generally noticed during the garbling. It must be remembered they are exposed to the light for the first time without Parchment covering. Beans pale to begin with get worse as the process goes on. Perhaps this is because the colour in the inner horny part is damaged; the Peeler instead of working on an evenly distributed pigment, only causes further injury by working on an uneven one and so aggravates the wound.

Coffee after milling is very susceptible to moisture, but by experiments it has been proved that keeping on the Coast during the early part of the season, in which the land winds are blowing, improves it, but later in the season, when the breezes are coming from the sea, the milled stuff deteriorates. At one time coffee used to be garbled on the Bunda by the sea, but now firms say this hurts the colour; if it is exposed to the atmosphere for a short time after milling it will never be the same as before; this would account also for a better outturn. Perhaps, as is said, working of the Mills more slowly would aid in the retention of colour; if so, a bigger trough than is in use by most firms would be advisable. The quantity of parchment to be got through in a season is great, and a large trough would not delay work, as it would hold more and, having a larger circumference, the roller would have more space to cover, and so would be working more slowly.

As regards the height at which the wheels are set above the trough, and their velocity, the majority of firms work these nearly at the same, so it is unnecessary to remark on them. The Curers having had the Mills under their hands, and tried all ways, have returned to the present way of working,

so one must draw the conclusion that it is the best, especially as they *cure their own coffee in the same way, and get no better prices*. One must also take into consideration that even if they rushed the stuff through the Mill, they would still have to garble it, and they would end in having a lot of milled coffee on hand, as only a certain amount of garblers are available. If the firms once got a name for badly garbling their coffee it would be extremely hard for them to retain their reputation in the London Market, and with their clients, the planters. I think it is much more likely that parchment, especially in a heavy crop, gets unevenly dried both on the Estates and on the Coast, and so batches containing beans at all kinds of average are put in Mill. As already remarked, this plus the harm done by the Peeler on all coffee would make the sample show up very badly when it reached home.

Reports from home on samples after milling are:—

1. "The hand-rubbed samples (after drying) are of magnificent deep colour, and coffee like that would sell at a tremendous price, whereas the sample taken after milling is grey and faded and has scarcely any colour at all."

2. "Later parcels show much less loss of colour from milling than earlier ones did, but it is now positively established that, however carefully the *Edge Runner* be worked, much loss of colour is caused by it during milling."

3. "Where the loss of colour does occur is in the mills. Every series of samples that you have sent attest this. It is absolutely unmistakable."

Winnower and Sizer.

The card is now entered up as far as 'Peeled.' The coffee goes on to the Winnower and Sizer, which are working at the same time as milling is going on.

Sizers consist of circular oblongs of mesh into which the coffee comes, after having its dust and chaff winnowed out by a fan. It is generally carried from the peeling pit by travelling carriers up to the Winnowers, and goes from them into Sizers, which revolve, letting each class go into separate compartments. The great thing is to get as much of the bold sizes as possible, and each class as uniform as possible. All the coffee Sizers at present in use class the beans according to their width and thickness, and afterwards in respect to their form, *i.e.*, flat or round. In such classification the result is very irregular because two beans although of the same width and thickness may vary considerably in their length, particularly in large Estates, where the coffees from high and low parts are cleaned together. Some firms have a subsidiary separator which removes the short from the long beans, producing a more even separation, and thus the look of the coffee is enhanced. This extra sizing is used after coffee has already been classed by ordinary Sizers. As small classes No. 2 and No. 3 have generally a lot of long beans mixed with them, these may be removed and added to No. 1, *etc.*, increasing that class of coffee. Another subsidiary machine is a Peaberry Separator, which separates flat coffee beans from "Peas," as some of the sizes after sizing still contain Peas which have gone through the mesh.

The principle of this latter machine is very simple, being a travelling band, having two cross pieces which keep the beans rolling, and so "Peas", being round, roll down, while flat beans are carried up.

There is a principle of mixing grades, but this is to be deprecated, as brokers fight shy of mixed grades, and it is also doubtful if it is legitimate,

whereas by the use of subsidiary machines grades are only improved, so that their use should be advocated. This brings us on to the next move of the Card, *vis* :—

The Garbling Rooms.

Garbling consists in making the coffee as presentable as possible for the market by getting rid of all beans which are *black, malformed, broken, pale, pulper injured*, etc. Each woman is given a bushel or so, according to size, to pick out as a day's task, and in the evening this is examined and, if not satisfactory, it has to be done again the next day. Careless checking will incur a bad sample being sent to market, as after being passed here the coffee is practically out of the Curer's hands. It is during this process that one sees the coffee as it really is, and its faults, such as lack of colour and form, etc., show up, especially when it is compared with a hand-rubbed sample taken before milling.

If one knows the style of cultivation and preparation as carried out on several Estates, and can see them in the prepared state, as during garbling, one is able to judge the benefit or otherwise of the system employed. One generally finds Estates which have been heavily manured with Poonac, Bones, Lime, Bulk, and such styles of manures, or new land, have quality as regards colour, form and size, whereas badly manured Estates and those which have been manured with chemicals only generally have pale looking coffee beans though the quantity of crop if manured with pure chemicals may be big. This leads one to suspect that pure chemicals are too forcing when used for obtaining big crops. The Garbling women are very experienced at their work, and one notices them going slowly through and through the coffee heaps, and a little heap of triage accumulating beside them. On examining the latter it will be found to consist of Broken, Foxy, Black, Pale, Pulper-rubbed, Cut, Pricked and Heavily Coated beans. Some firms, after passing the coffee once, put it in the hands of special women who regarble it, but this is only done with extra good coffees; with some coffees one could go on garbling *ad lib*. The amount garbled by each woman is anything from half to two bushels a day, but depends on size, the big sizes being easier to handle than small; bad quality of coffee is also harder to garble.

Of the stuff garbled out Broken and Black explain themselves. *Pulper pricked* is distinguishable by a small hole with an accumulation of pigment round it. Pulper cut and rubbed need no explanation.

Pale beans, if pale before Peeling, (noticed in the hand-rubbed samples) are very noticeable. If turned pale by going into the Peeler damp, or otherwise injured in the process, they show the faint white line round the outside edge of the bean. Beans thus marked will be quite pale by the time they get home, as this means they still contain moisture and will ferment in the sacks during the voyage. Heavily coated beans are generally caused by leaf disease, unripe, or badly fermented coffee. A badly fermented coffee will show up very heavily coated. It differs slightly from leaf disease by being very shiny, and the quantity obtained is greater, especially in the last batches from the Estates. This, I expect, is because the last pickings consist of fruits which the trees can mature well and so they are lacking in glucose. Foxy beans ought to explain themselves, but some planters if told their coffee is foxy, will say the Curer must have caused it. I believe the beans to be turned foxy must have their pulp fermented with the berry, either before pulping or by excess of pulp in the parchment vats. Thus a Curer, unless he had some badly pulped beans sent down in a damp state with the skin on them, has nothing to do with the question, he only knows that much as the consignor dislikes being told his coffee is slightly foxy, it is best to say so, as the brokers spot it at once, even on coffee in which

the percentage is very slight. As a rule, heavy prices for triage when compared with the price of B show bad curing, or excessive Garbling causing the triage to contain a lot of bold, or that the Curer has had bad coffee to deal with, as pointed out before, owing to the coffee not improving on the Coast, when the sea breezes set in. It is therefore very necessary to get it shipped off as soon as possible.

We have now arrived at a period when the coffee is finished and it is next weighed very carefully into the sacks; these by the way, are each weighed separately before being filled, and stitched up. We have now got our outturn of clean Coffee, and a few words on outturn will not be out of place, as Planters generally attach too much importance to outturns, which are no criterion that Curers have prepared their coffee any better; in fact unless the coffee is exceptional, a very good outturn may mean that a little bit more moisture is left in the bean than is safe, and so the prices realized may yet be small, as the coffee will deteriorate on the way home. Bad outturn does not mean bad prices and *vice-versâ*, as in fact some coffee with frightful outturns gets very fine prices. A damp coffee will give a good outturn, and so one must always bear in mind that a Curer could give you pretty well what outturn he liked, by not properly drying the Coffee.

Of course, a good coffee, well and evenly dried on the Estate and at the Coast, will generally give a good outturn, and what is more will fetch a good price.

Our coffee is now finished with as far as the curing yard is concerned, and only awaits shipment.

SHIPPING.

This is done at Mangalore by British India and Sheppard's Lines, which carry stuff to Bombay for shipping on board P. and O. through Steamers.

British India boats come in at intervals, but are very uncertain as to time. It is very often not advisable to ship by them, as they miss the P. and O. boat in Bombay and then the coffee has to wait 14 days in Bombay Docks. Coffee is not regarded as a favoured cargo, but I will say they take as much care as is possible under the circumstances to see that no harm comes to it.

Coffee has to be on "Lighters" before the Boat arrives, and has often to wait on the river, or to return to the Bunda at night, as steamers do not wait long, and if there is a great quantity to be sent, it stands to reason that it must be ready beforehand, as the lighters are slow in getting out to the steamers, which lie a good distance off; thus it may get harmed by damp, or by bilge water from the bottom of the Lighters being sucked up into the lower sacks. One has only to cross the Mangalore bar in the afternoon when a heavy wind is blowing to understand this.

Sheppard Steamers are much more satisfactory than B. I., as they have an agreement with B. I. *in re* trading between Bombay and Mangalore, and so are regular weekly arrivals. The boat though which leaves just before the P. and O. is due to leave Bombay does not always get in time, as coffee must be in Bombay a day earlier or the P. and O. will not take it, and so the coffee has to wait in Bombay for the next boat a fortnight hence. Still they are by far preferable for shipping by than B. I. owing to their regular arrival and departure, besides coming in nearer to the Bar than the B. I. which lie several miles out.

At Calicut and Tellicherry the shipping is mostly done by the Clan Line which run through to London direct.

I hear in Bombay petty thieving goes on, especially while the coffee is awaiting shipment. A well informed native told me that it is carried out by

means of rice testers, a small tube which they use for putting into rice sacks and so drawing a sample from any part of the sack, without having to open the sack, the hole made being so small that the threads can be pressed together again by one's fingers. This mode of thieving is very likely, as it would be very hard to detect. This is avoided by using a Clan boat, which is direct, and the coffee passes through very few hands compared with other Lines mentioned.

This finishes the enquiry into the Curing, and a few points as a Summary will not be out of place.

SUMMARY.

1. Cultivate well and put in plenty of manure, but not chemicals such as Superphosphates, if you want quality unless you back up the same with bulk.

2. Pick ripe fruit and pulp soon after picking.

3. Ferment well to avoid coated beans; good fermentation is conducive to even drying.

4. Wash well and with clean water. Keep clean, and do not let the dust of the drying ground mix with the parchment, especially if the latter is wet.

5. Dry as evenly as possible. By evenness is meant, get each bean as near the same state of dryness as possible. The great thing in order to get the best results with an Edge Runner is an even and thorough drying, and an unevenly dried coffee turns paler than any other during peeling.

6. Don't mix lots of coffee, if not of the same degree of dryness. Send them down marked separately. I believe that coffee after having been dried to a certain weight requires to be finished off quickly, the final drying should be done in as direct a sun as possible, *i.e.*, on the Coast. This last opinion is made with reserve, as it is a very intricate question which I have referred to at length under the head of Drying in the main article.

7. Be careful not to split parchment by overdrying, or drying too quickly, as this will cause pale beans.

8. By multiplying Bushels of Parchment by 2,240 and dividing by the number of lbs. of clean coffee the outturn is obtained and proved.

9. Some Planters sack their coffee as soon as it is dry and keep it thus in store while the other is drying. I think it would be better if it were heaped and only sacked just before despatch, as in heaps it may be continually turned over and this process helps in evening the colour.

In conclusion, we may, I think, say that colour depends on the result of a series of different processes and not one single act. Failure during any part of the process after the coffee fruit is ready to be picked, *involves failure all along the line*. Each process helps the other, and even though we have proved that the Edge Runner does harm to the colour of the bean, still till some other peeler is invented (there is not one in the market at present which does less harm and will deal with bulk better) the plan seems to be to get the best results possible out of the present Mill, with the means at present at hand. It must not be forgotten that if one could have seen in bulk the prepared coffee when prices were high, there would no doubt have still been noticeable the gap in quality, showing which planters took the greatest care over drying-ground preparation, and who highly cultivated their Estates, these getting better results than those who had badly looked after estates.

(To be continued.)

DISTRICT PLANTERS' ASSOCIATIONS.**Shevaroy Planters' Association.**

Proceedings of a Quarterly General Meeting of the Shevaroy Planters' Association held in the Victoria Rooms, Yercaud, on 5th December, 1910.

PRESENT :—Messrs. S. Campbell, R. Gompertz, C. G. Lechler, J. C. Large, C. Rahm, W. Rahm, F. D. Short, and Ch. Dickins (Honorary Secretary and Chairman).

The notice calling the meeting having been read, the proceedings of last Committee were confirmed.

The Honorary Secretary stated it gave him great pleasure to announce that Mr. R. Gompertz had consented to serve on the Committee.

Forest Reserve.—Read letter dated 5th November 1910 from L. E. Buckley, Esq., the Collector and District Magistrate, regarding reserving land on the slopes of Shevaroyan and Bran-field Hills.

Resolved that the Honorary Secretary be requested to thank the Collector and District Magistrate cordially for his letter and for the information given in it with reference to the contemplated reserve.

Scientific Department.—With reference to Circular 51/10 dated 24th October 1910 from the Secretary, U. P. A. S. I., the following resolution, proposed by Mr. C. G. Lechler and seconded by Mr. F. D. Short, was carried unanimously :—"That the Honorary Secretary be requested to draw up and circulate an open letter asking members of this Association to agree to a uniform tax of 6 (six) annas per cultivated acre, which, if agreed to, will in the opinion of this meeting more than suffice for payment of all present expenditure, and enable us also, in conjunction with other Associations, to pay for one or two Scientific Assistants to Mr. Anstead.

King Edward VII Memorial Fund.—The Honorary Secretary informed the meeting that donations to the Fund from Members amounted to Rs.190.

(Signed) CHAS. DICKINS,
Hon. Secy., S. P. A.

PLANTATION PARA.

In a letter to the Editor of the *India-Rubber Journal*, Mr. Henry A. Morss, of Boston, Mass., writes :—

"About a year ago, when in London, I called upon you and we discussed Plantation Pará Rubber, in which I had become much interested owing to a recent visit to the Federated Malay States. I informed you that I had bought a small amount of crêpe rubber in Singapore, and that I should experiment with it, and compare it with South American Pará.

"I can say now that so far as my own business is concerned, which is the making of rubber-covered wires and cables, the rubber that I bought was not satisfactory. However, I have now had some further experience with Plantation rubber, as I have bought several small lots, mostly from Ceylon. My experience is that, while the Plantation rubber is clean, and on the whole has good mechanical qualities, only smoked rubber is suitable for our use. We have been unable to make a compound with acid-cured rubber which will withstand the searching electrical tests necessarily applied. On the other hand, we have been able to do fairly well with smoked Ceylon, although, owing to varying quality, we cannot depend upon it for the highest class of work.

INDIAN TEA ASSOCIATION, CALCUTTA.**Blower's Solution.**

The subjoined copy of a Report by one of the Association's Scientific Officers on tests made with fresh solution (Blower's) has been circulated for information.

TEST OF BLOWER'S SOLUTION ON HELOPELTIS (*Tea Mosquito*).

1 part concentrated solution in 50 parts water—No effect at all.

1 part concentrated solution in 30 parts water—Adult insects were at first stupefied but recovered quickly; the same insects were treated a second time with the same results.

1 part concentrated solution in 15 parts water—Adult insects were at first stupefied but recovered shortly afterwards. These were again treated, but all recovered and became lively after being stupefied for a short time.

1 part concentrated solution in $7\frac{1}{2}$ parts water—Adults were twice treated and each time became stupefied but afterwards quite recovered.

1 part concentrated solution in 4 parts water—At this strength the insects are rarely killed, the majority have to be twice treated and even then all are not killed. Recovery takes place in most cases within 5 minutes of treatment.

The effect on the young foliage in the strength of one part solution and 4 parts water is to burn it, and the workers' hands and clothes are badly stained.

These tests were made in the laboratory, but the insects were found to recover more quickly in the open air and sun outside the building.

Blower's solution, therefore, 1 part in 4 of water, cannot be considered effective on the Tea Mosquito, though it may be on certain other pests. In this strength the actual cost of the material, with the concentrated solution at the price of As. 6 per gallon and applied to blighted tea in one application at the rate of 300 gallons to the acre works out to Rs.22-8 per acre.

Considering that the mixture is ineffective even in the proportion of one to four, and one application is useless for the treatment of Mosquito Blight, the cost per acre of one application becomes quite prohibitive and to use Blower's Solution in the treatment of *Helepeltis* is total waste of time, money and labour. It must be remembered that this solution has no lasting effect on the bushes but is purely a contact insecticide and ineffective at that. The concentrated solution alone without dilution will kill *Helepeltis*.

C. B. A.

Kanny Koory, 21st November 1910.

KEROSENE EMULSION.

Take 1 pint kerosene, 2 oz. common soap, $\frac{1}{2}$ pint rain water. This will make $1\frac{1}{2}$ pints of emulsion. Cut the soap, if hard soap be used, into thin slices, so that it will dissolve easily in the proper amount of rain water when heated to boiling point. When all is dissolved, pour the boiling solution into a vessel containing the kerosene and churn well. The emulsion should not be diluted until required for use, when hot (rain) water, if possible, should be used. The final strength of the emulsion must depend upon the trees or plants it is to be used upon. A very strong wash for winter use is 1 part kerosene to 20 parts of water. For trees in foliage, 1 part emulsion to 30 or even 25 would be strong enough.

CORRESPONDENCE.

Tapping Ceara Rubber.

With reference to Mr. Anstead's reply to my letter in this week's *Planters' Chronicle* :—

I think Mr. Anstead is mistaken when he says:—"Mr. Wicherley, I take it, means that the Ceará is not to be stripped of its outer bark" that is, not out of curiosity, etc., since, in line 12 of the same page Mr. Wicherley says: "The tree should then be tapped immediately," *i.e.*, immediately after the removal of the outer bark. Again, in line 28, he says: "The Ceylon planter makes the terrible mistake of paring his tree and then leaving it to grow before he attempts to tap it." By the context, paring in this case means stripping off the outer bark. So that Mr. Wicherley states distinctly three times during the course of his interview, that Ceará should be tapped *immediately* after the removal of the outer bark.

Yours faithfully,

BERTRAM RUSSELL.

[*Note by the Scientific Officer*—This discussion resolves itself into the latitude which is to be allowed to the term 'immediately.' I agree with Mr. Wicherley that it is a mistake to pare the tree and then not tap it, but he and Mr. Russell will find *in practice* that if they try to tap *immediately* the outer bark is removed, for instance the same day, the inner bark is so soft that the knife tears it instead of making a clean cut. Mr. Russell has only to try this on a tree or two to find out the difficulty, and he will then be obliged, I think, to adopt my advice, and the plan followed by those who are tapping Ceará trees in South India, of allowing the inner bark to harden a little before commencing operations.—R. D. A.]

CAMPHOR PRODUCTION IN GERMAN EAST AFRICA,

[In *Der Pflanzer* (1910, 6. 86) some information is given regarding the results of a long series of distillation trials carried out at the Biological Agricultural Institute at Amani with cuttings from the camphor trees grown in that district. The total number of trees available is about 3,500, mostly three and a half years old with a few one year older. These were cut back to the extent of about one-third of their growth. This cutting back produced no ill effects, and at the end of the ensuing rainy season the trees had regained their original size when cut.

The results of the distillation trials are of interest as confirming experience in Ceylon and elsewhere that the leaves are richer in camphor than the wood. In the present experiments young twigs and leaves yielded on the average about 1'2. per cent. of distillate, of which 0'8 to 0'9 per cent. was camphor and 0'3 to 0'4 per cent. oil. The latter still retained camphor, which could be recovered in working on a large scale, so that the yield of camphor in these experiments is estimated at 1 per cent. Woody branches, on the contrary, yielded only 0'158 per cent. of distillate consisting of 0'061 per cent. camphor and 0'097 per cent. oil. In growing camphor trees, therefore, it is pointed out that the planter's main object should be to encourage leaf formation. It was found advantageous to carry on the distillation in dry weather, as then the raw material was drier to start with and the actual distillation could be carried out more quickly. No certain difference could be detected in the yield of camphor obtained from leaves and twigs collected from trees grown at different altitudes.

TEA.**China Tea in London.**

Now that the season is half-way through, it is interesting, observes the *Grocer*, to look at the position of China tea, and see how far the blenders can estimate it, and supply the deficiency there may be in British-grown tea. The China season commenced full of promise for medium to fine Monings from 6*d.* to 1*s.*, as virtually all the old teas of this class were used up, and those members of the trade who sold pure China tea for self-drinking, also such people as the big catering companies, were just living from hand to mouth, and paying 2*d.* per lb. more for such teas than they could have been bought at earlier in the season. But common teas under 5*d.* were in fair supply, and the blenders of cheap grades had stocked themselves with more than they wanted from 4½*d.* to 4¾*d.*, and were using a better tea at 5*d.* and 5½*d.* instead.

As is always the case when teas are scarce and dear, the exporters in China rushed in at Hankow and paid too much for the better grades, especially for the red leaf flavoury Keemuns. The crop was also larger and the shipments to the United Kingdom have been 2 to 3 million lbs. more than last season. The teas were not so much liked as last season, and the extraordinary thing is that the trade seem to have been able to do without them, especially the low-priced flavoury Keemuns, and after just helping themselves to retail quantities, the importers have a large quantity still left on their hands, and this also applies to the better grades of Keemuns, say, from 1*s.* to 1*s.* 2*d.* Finest teas, however, were in small supply, and from 1*s.* to 6*d.* to 2*s.* 3*d.* the trade bought all there were, and at very full prices. Common teas were scarce and dear in China at first, but two big shipments arrived here in September and October, and being bought very cheaply in China, the bulk of them were sold to arrive very cheaply, a large proportion going direct to the Continent. The blenders secured some of these teas but thinking they were going to get large quantities of this class, only bought a little to go on with, and towards the end of October and the beginning of November found out their mistake, and the market has now been swept of everything up to 5*d.* at ½*d.* and ¾*d.* per lb. rise. All old stocks have also been cleared out, and if the rise in British-grown teas continues, the blenders will be awkwardly fixed, as there is no doubt they are all using more China, as the duty payments during the last three months show an increase of 25 per cent. of Congou, or, say, 1 million lb. per month now, instead of ¾ million. Moning dusts and Panyong fannings have been lying dormant for the last year or so, but even these are now getting into small compass, as they have been quietly used up without any notice, and the supply left would go a very little way with blenders if they do really get hard pressed.

Supplies from Foochow have again been very small this year, but they are very little used by the trade and go principally for export, or in export, blends, so that there is no encouragement for the importers to bring over low-priced teas from Foochow, where they have some leaf for which about 5*d.* per lb. is wanted. The crops, both from the North and Foochow, have been good, useful teas, but plain and coloury in cup, with no distinctive point, and this applies to the best teas; hence possibly the reason why buyers have purchased only just from day to day to make up a blend. Lately the trade have brought a fair quantity of medium grades between 6*d.* and 9*d.*, and if importers would only drop the price of the good flavoury Keemuns between 8*d.* and 1*s.*, say, 1*d.* or 2*d.* per lb., no doubt it would much encourage business. Supplies, however, are in manageable compass, and if deliveries go on at the same rate as during the last three months, there will be only enough to last out the season.

COFFEE.**The London Market.**

Those who have been responsible for the upward movement have been able to carry the market still further, says the *Produce Markets' Review* of November 19, 1910 and a little buying on actual trade account has helped to raise prices 4s. per cwt. This has made the quotation for the current month 50s., a price which had not previously been reached for some years. It must still be remembered that buyers who take delivery have to pay 8s. or 9s. above the contract price, for there is no 50s. coffee in the market to tender. Rumours have been circulated freely that the crop prospects are not so favourable. Although these reports are said to come from reliable sources, it must not be forgotten that times of excitement like the last few weeks seem to induce statements which are readily accepted, but which more often than not prove to be fallacious. The area under Coffee cultivation in Brazil is enormous, and after four years of moderate and even small crops it would not be surprising to see an exceptionally large one, and up to the last week or two the reports have all been most favourable. There is little doubt that dealers in all parts of the world have allowed their stock to run very low, so that unless the consumption is checked buying must continue to be freer than usual. The recent advance has naturally made buyers eager to take anything offered on the old basis, hence the improved demand of descriptions other than Brazil. Several sales are reported of East India and Costa Rica at rates which were not obtainable a few weeks ago, and the auctions, which have not contained much besides Columbian, have shown a steady demand at an advance of 3s. or 4s. Very little is obtainable under 60s. and Coffee at from that to 70s. is much the cheapest there is, for instead of 20s. between it and low Santos, the difference is only about 5s. or 8s. per cwt. It is only reasonable, therefore, to expect an advance in such qualities.

Crop in Guatemala.

H. M. Vice-Consul at Guatemala (Mr. G. D. N. Haggard) reports, under date 28th October, that the 1909-10 coffee crop in the Guatemala Republic amounted to about 650,000 quintals of clean coffee, and that the prices obtained were on the whole good. The 1910-11 crop is expected to amount to some 800,000 quintals, and, judging from present indications, should realise good prices.

[Quintal = 101'4 lbs.]

The rubber at present exported from French Indo-China is obtained from wild creepers which are principally met with in the forests of the Upper Laos. These have been worked in a ruthless and improvident manner so that supplies are becoming more and more difficult to find, and the export of rubber has fallen from 372 tons in 1905 to 35 tons in 1909. During the present year (1910) however, the increased price of rubber has caused the collectors to travel further to find it and the export will be considerably larger. Plantations of Hevea have been made in South Annam and Cochin-China. The former, which were on a small scale and chiefly of an experimental nature, have succeeded well. The Plantations in Cochin-China are not yet in bearing. There were some 15 plantations containing 650,000 trees at the end of 1909, a figure which will probably be increased to 1,000,000 during 1910. It is estimated that the production of rubber from the plantations now existing, which during 1910 will be only 6 tons, will amount to 1,000 tons for 1918. Many new plantations are being commenced or are in contemplation. In Tonkin the winters are apparently too cold for Hevea; plantations of *Ficus Elastica* exist, however.

RUBBER.**Tapping and Curing.**

The following extract is taken from Notes on a Recent Visit to Sarawak and Malaya, contributed by Dr. Philip Schidrowitz to *The India-Rubber Journal*, and relates to :—

MALAYA.

Tapping—In the Selangor district there seems to be a general consensus of opinion that the ordinary gouge is the most suitable instrument. Two species of gouges are mostly employed, namely, the plain gouge and the wry-necked gouge. It is held that the plain gouge is really the best instrument, but requires more skill, and the general practice seems to be to allow the well-trained coolie to employ the plain gouge and the relatively new hand the other variety. In other districts I here and there saw patent knives, but the general impression produced on me was that on the whole they are very little used. Another point on which opinion appears to be fairly unanimous is that high tapping is not practicable or desirable, and that it tends to cause the trees to run dry. The general impression I received is that there is still a good deal of useful work to be done in connection with the tapping and collection of latex, as well as in regard to coagulation and curing generally. There is no doubt that the substitution of enamelled, or preferably glass, vessels for tin or cocoanut husks constitutes a considerable advance. With regard to the work still remaining to be done in connection with collection, this will tend in the direction of obtaining the latex in as homogenous a condition (as regards concentration or fluidity) as possible ; of keeping mechanical impurities out of the latex, and of decreasing the amount of scrap. I may here say, for those who are not familiar with modern plantation practice, that scrap is made from the material which coagulates prior to bringing the latex into the factory. The formation of clots in the field depends not only on the quality of the latex, but also on the amount of water put in the cups ; on incidental rainfall, and on the mechanical impurities which may find their way into the cups or vessels. With regard to the uncoagulated latex these mechanical impurities are of secondary importance, as the latex is, of course, strained prior to coagulation. In the case of the scrap it is impossible to remove these impurities entirely, and I venture to suggest, therefore, that it might be worth while to try straining the latex in the field. I do not think this is impracticable, and the cost of providing a strainer on wheels at each sub-station would be very small. The question of water supply and quality of the water is an important one in regard to field work, and there are numerous other little points in connection with this work which are well worth studying if improvements in quality and yield are desired. I may perhaps be permitted to say that Mr. Morgan, the chemist to the Rubber Planters' Association, is dealing with this exhaustively, and that there should be excellent results to the industry from his work in this and other directions.

Coagulating and Curing.—Although it cannot yet be definitely said that coagulation with acetic acid is the most suitable method from every point of view for coagulating plantation latex, the fact remains that at the present time probably 99½ per cent. of all the plantation rubber produced is coagulated in this manner. On some estates the amount of acetic acid is carefully regulated, on others a more or less haphazard method of using the acid is employed ; in fact I found on some estates that the managers did not know even the strength of the acid, and always used the same quantity whatever the condition of the latex. I doubt whether it is practicable to test each batch of latex

in regard to rubber content, acid, etc., but there is a golden mean between the two extremes, and it certainly seems to be the case, as far as practical experience goes; that the less acid employed the better the result. No doubt the truth is that for each latex there is an optimum point in regard to the quantity of acid that should be employed, but I do not propose to enter into a discussion of the more scientific and theoretical aspects of coagulation. Plantations which belong to the associations which are taking steps to have this and kindred matters enquired into scientifically and practically by qualified observers may rest assured that they are being worked out in a thorough manner, and I for one will await with interest the results which may be achieved. Leaving aside, however, the plantations which are treating matters on a scientific basis, I was struck by the fact that in many quarters there was a show of considerable indifference in regard to small matters, that is to say matters which appear small at the present day. I was several times, in reply to suggestions dealing with minor points, met with replies to the effect that it really did not matter whether the plantation got 4d. or 6d. more or less for its rubber. With prices ranging in the neighbourhood of 10s. to 12s. for an article which can be produced down to 1s., or even less, 4d. or 6d. may seem a small item, but the time will assuredly come when that 4d. or 6d. may make a big difference, in fact for the less favoured estates all the difference between a profit and a loss. Those who are looking after the pence now will earn the pounds later on, and those who are neglecting the pence now may find that when the critical time comes it may not be so easy to make up for lost ground.

A satisfactory method of imitating the Pará method of curing and smoking rubber does not yet appear to have been evolved in Malaya; I am inclined to think that this is a subject which is worthy of greater attention than has been paid to it in the past. There is as yet no practical proof that plantation latex cured by the Pará system is either better or worse than the rubber produced by the acetic acid method. Whether plantation latex is capable of being satisfactorily cured by the Pará method, and how such rubber compares with Pará rubber are questions which are well worth studying on a large scale, particularly in view of the fact that plantation rubber has now lost not only its premium over Pará rubber, but is considerably behind it in price. I would suggest to the plantation interests that they should on the one hand have parallel experiments made in South America by the ordinary method of the country and by the plantation method, and conversely, have parallel experiments made in Malaya, and getting for that purpose several skilled Seringueros from South America to work the Pará method. Such experiments must be conducted on large quantities of latex, if they are to be of any practical value. That is to say, half a ton or so should be made by each method both in South America and Malaya, so that the products may be given a very thorough trial at home.

With regard to the handling of latex during and after coagulation, the tendency seems to be to work as much as possible in small vessels, and for rubber of the smoked sheet type. For those who are not familiar with the general practice, I may say that the coagulating pan employed is generally about 30 to 40 inches in length and 12 to 14 inches in breadth. The clot obtained is passed frequently only once through the washing machine, and is then taken direct to the drying shed. Practically speaking there is no washing, the passage through the washer merely squeezing out the greater part of the serum and causing the well-known hardening of the rubber which takes place after rolling. The most modern and favoured type of washing roll appears to be that run at a differential speed of two to one, the rolls very wide in proportion to their length, and with guides projecting

well into the centre of the roller. Rolls built on these lines almost entirely prevent any oil or dirt getting on the rubber from the machine. Only in a few cases did I see even speed smooth sheeters employed, and I certainly think that a passage through a roll of this sort after the rubber has gone through the washer improves the strength. Scrap, of course, is treated on different lines, and is thoroughly washed and transformed into crêpe in much the same way as rubber is washed in the factory at home. With regard to bark scrap, I think that improvements are possible, and no doubt some of the newer types of machines for this class of work will soon be given a trial on the plantations.

Drying and Smoking.—There is an increasing tendency to provide the drying shed with a smoking appliance, but for the present this appears to be limited to the production of smoked sheet. Scrap (*i.e.*, crêpe) is, as a rule not smoked, the reason being that whereas sheet tends to mildew if not smoked, crêpe is not affected in this way. Personally I am inclined to think that it would be well worth while smoking all the produce, for there is very little doubt in my mind that smoking not only tends to preserve the rubber in good condition, but that it actually adds to the strength of the material. With regard to smoking appliances, I am inclined to think that the simplest form, namely an open brazier or stove, placed on the bare earth in the lower part of the smoking shed, and separated from the rubber hanging on the floor above by means of perforated iron, wire or tiles (*i.e.*, on the same principles as the ordinary Scotch malt kiln) and provided with the necessary baffle plates, etc., is the best type of arrangement. There appears to be considerable advantage, too, in having the sides of the lower part of the building sloping inwards, as this causes a more regular distribution of the smoke. This arrangement requires very little superintendence, and is practically without danger. In my opinion outside furnaces, particularly where there is any length of run to the rubber houses, are not so good. It is true that the inside method involves a considerable waste of space, and means larger buildings. Where these points are of material importance the outside stove with a short run should be employed. The drawback to the ordinary dry and smoking system is undoubtedly the length of time that is required to dry the rubber, and this particularly in the case of thick sheet of crêpe. I think there can be no question as to its being a mistake to attempt to make thick sheet or crêpe in one operation; it is decidedly preferable to make thin crêpe first, and then, if thick crêpe is desired, to put several layers of the thin material through the rolls. I make this remark because I visited one plantation on which the manager was almost in despair at the time it took him to dry his thick crêpe. I came across very little evidence tending to show that the vacuum drier was in any great favour, but I am still inclined to think that properly handled it is a useful auxiliary on the plantation.

Para and Ceara in Nyasaland.

It has been conclusively proved, says a consular report, that the Shiré Highlands are not suitable for the cultivation of Pará rubber; in fact the only locality within the Protectorate where this variety has proved successful is in the West Nyasa District, where 600 acres of Pará are doing well.

The rubber of Nyasaland is Ceará, and the area under this has risen steadily to 4,403 acres. The quality of the rubber is satisfactory, two experimental packets having realised 8s. 10d. per lb. in London. The export, including wild rubber, amounted to 27,144 lbs., being an increase of about 11,000 lbs. on the preceding year.

It should, however, be stated that at present the available data regarding the length of life of Ceará trees and their recuperative capacity under tapping are insufficient to justify any confident production as to whether it would be safe for planters to enter into this cultivation on a large scale. So far as local experiments have been carried, at present they go to prove that Ceará trees are successful when planted in suitable soil and properly tended, but the idea, prevalent a few years ago, that Ceará will grow anywhere is quite erroneous. It is worth noting that rubber seed has been distributed during the year to a number of natives in West Nyasa, and has been planted in the environs of 66 villages in that district.

In Bolivia.

Next to tin the most important product of Bolivia is rubber, of which in 1908 about £600,000 worth were exported. The exploitation of the rubber lands is regulated by law by payment of a tax of 1 Bol. yearly. It is found principally in the north-east, near the Peruvian boundary; in the east in the provinces of Santa Cruz and Azero, and in the Acre and Beni territory, which is the richest in this product.

The Acre is watered by several large rivers having their origin in the Cordillera, and flowing into the Amazon. These rivers are the Beni, Madre de Dios, the Orton and the Acre. The capital is Puerto Acre, which is connected by water with the important Brazilian commercial town of Manaos.

During the rainy season, which lasts from September till May, the rivers are flooded, and the country becomes extremely unhealthy, black-water fever and malaria being prevalent as well as the dreaded beri-beri. A comparatively large number of Europeans, Brazilians, and Asiatics are resident in the Acre, the population whereof, exclusive of Indians, would amount to about 25,000.

Two varieties of rubber plant, says our Consul, are found in this territory, the caucho, which has to be cut down in order to extract the sap, and the Hevea, which is merely tapped. In some cases the trees are tapped during a period of two years, and are then rested for a similar period. Other rubber trees are tapped for six years at a time and then left untouched for a like term. The trees selected for tapping in the Acre are usually from 30 to 40 years of age, and are expected to yield for 20 years, after which they become useless.

State Regulation of Rubber Planting in Cochin China.

The *Depeche Coloniale* (Paris) of 15th November states that the Government of Cochin China are taking measures to foster the rubber industry. New regulations concerning the grant of concessions for so-called "red earth" lands have lately come into force. In the provinces of Tay Ninh, Thudaumot, Bienhoa, and Baria, concessions are now only granted subject to the express condition that the lands are used for rubber planting. In every case the holder of a concession must each year plant at least one-tenth of his holding if it be less than 500 hectares, and one-twentieth of it be more than 500 hectares, in extent, with rubber trees, so that at least one-half of the holding must be under rubber cultivation within ten years. Each hectare must be planted with not less than 120 trees. The planter only becomes absolute owner of his concession when half of his land is planted with rubber.

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The Scientific Officer.

Mr. Anstead is certain to be at head-quarters until the end of this month. Plans for his tour in January have not yet been arranged, but are under consideration.

The arrangements in the laboratory are now practically complete, only a few minor details remaining to be attended to. All apparatus and stores ordered from England have been received, and work has been commenced.

"Ammonia for Ceara,"

In Sc. O. Note 76 (P. C. Vol. V, p. 546) it was stated that Commercial Ammonia, in 5 gallon drums, costs in Bangalore $8\frac{1}{2}$ annas a pound.

This was a mistake. The lowest price at which purchases can be made here appears to be $12\frac{1}{2}$ annas a pound.

Number of Plants per Acre.

Most planters probably know the figures in the subjoined table by heart. As, however, there are occasions when inquiries are made as to how many trees an acre will hold when they are planted certain distances apart, the table is given here for reference:—

Feet.				Feet.					
2	x	4	...	5,445	12	x	13	...	302
2	x	5	...	4,356	12	x	16	...	227
3	x	4	...	3,630	12	x	18	...	201
3	x	5	...	2,904	15	x	15	...	193
3	x	6	...	2,420	16	x	16	...	170
4	x	5	...	2,178	18	x	18	...	134
4	x	6	...	1,815	18	x	24	...	100
6	x	6	...	1,210	20	x	20	...	108
6	x	8	...	907	20	x	24	...	90
8	x	8	...	680	20	x	30	...	72
8	x	9	...	605	24	x	24	...	75
8	x	10	...	544	24	x	30	...	60
9	x	9	...	537	30	x	30	...	48
9	x	10	...	484	30	x	36	...	40
9	x	12	...	403	30	x	42	...	34
10	x	10	...	435	36	x	36	...	33
10	x	12	...	363	40	x	40	...	27

To ascertain the number of plants required for an acre at any given distance, divide 43,560 (the number of square feet in an acre) by the distance between the plants in the rows multiplied by the distance between the rows. Example: Plants set in rows 4 ft. apart with plants 2 ft. apart in the rows gives each plant 8 square feet; 43,560 divided by 8 gives 5,445 plants per acre.

Notes and Comments by the Scientific Officer.

87. *Green Dressings*.—In the Report on the Botanic Station, Antigua, British West Indies, for 1909-1910, attention is called to the fact that the quantity of green material yielded by a dressing does not represent the amount of solid material which is ultimately returned to the soil. The greater part of any plant in its living state is made up of water, this reaching as much as 76 per cent. of the total weight in the case of some green dressings.

Another interesting point raised in this report is the effect of the lengths of the roots of green dressings. "It is known that the roots of plants which use different layers of soil for the obtaining of their plant food flourish better when grown together than when grown with those that utilise the same layer for this purpose; it is thus probable that deeply rooted plants would be of value in placing at the disposal of the subsequent crop plant food in an assimilable form which otherwise would not be within its reach."

This would be the case with a crop like Coffee which is a surface rooter and which feeds on the top layer of soil. A number of measurements of the main roots of different green dressing plants are given, among which appears *Crotalaria striata*, which 240 days after planting had main roots 19½ inches in length.

88. *Scale Insects on Pepper*.—Some leaves of Pepper have been sent in densely covered with a flat, thin and papery Scale with a pale yellow central spot. This has been identified by Mr. Green, the Government Entomologist, Ceylon, as *Aspidiotus destructor*, Sign. Mr. Green says, "*Aspidiotus destructor* occurs very commonly upon wild Pepper in Ceylon, but I have found it only occasionally upon the cultivated plant. It is an omnivorous feeder, nothing seems to come amiss to it. In spite of its sinister name, and of the profusion of the insects, I have never found it to be a serious pest. It is probably kept in check by the *Coccinellidae* (Lady Bird Beetles) which are almost constantly in attendance upon it."

Lefroy reports this Scale on Mango and Palms, and in the West Indies it was common on a number of plants such as Nutmeg, Guava, Coconut, &c.

In the instance under reference the larvae of a Lady Bird Beetle were present with the Scale, and these had been preying largely upon the scales, as a great many of them were dead. These larvae had waxy processes on their bodies, making them look very much like the young forms of Mealy Bug Scales.

If this Scale is found to do damage to Pepper, the leaves attacked should be picked off and burned at the beginning of the attack, as it is a difficult matter to spray a pepper vine and successfully wet the under side of all the leaves, where these scales are chiefly feeding.

89. *Fish Manure*.—Many samples of Fish Manure contain a large percentage of Sand, and it would be a great advantage if this could be sifted out to save cartage expenses. Some samples also contain a high percentage of Fat, and though this contains Nitrogen which gradually becomes available, its presence in large quantities is not desirable. The presence of more than 3 per cent. of Fat has been said to delay the decomposition of the Fish, but this has never been really demonstrated. Fish manure should be valued on the basis of Nitrogen and Phosphoric Acid content. Milling makes it more readily available and is often of advantage.

RUDOLPH D. ANSTEAD,
Planting Expert.

PLANTERS' PAPERS.**III—The Curing of Coffee.**

A Résumé of an enquiry made after a great outcry from Home Brokers and Buyers in 1903 that the bulk of East Indian Coffee had deteriorated, and that marks were full of Pale Beans; undertaken by E. W. R. for the purpose of obtaining samples of his proprietor's coffee during preparation at Mangalore and thus discovering what influence, if any, the Coast Curing had on the colour of beans.

[The reader must understand that the writer when making the following notes was only investigating the general practice of curing in so far as it had any bearing upon the colour of the beans, and was not investigating a curer's work.]

[Concluded.]

ODD NOTES.

(1). Floating of fruit before pulping might be of advantage, as by this means inferior (light) and immature berries could be floated off and prepared separately.

(2). *Colour*, which has such a great influence on the market price, chiefly depends on the quantity of water contained in the beans. Blue contains more than green, green more than yellow. Slow drying in a damp atmosphere will give a bad colour.

(3). *Value on Colour*.—Deep blue, or light green, smooth, pale, almost yellow will be chosen in preference to grey, brown, or dull colourless. Blue and green must also have waxy hard texture and be heavy when tossed in hand.

(4). *Value on Taste*—depends first on acidity. By acidity is meant a certain acid taste, not sourness. Second, on nutty thick flavour.

(5). Mysore has thick rich pungent taste. Coorg, acid yet full bodied.

(6). There being no standard in sizing, "A" of one estate may be no larger than "B" of another.

(7). The Fazendas of San Paolo are the best equipped Estates in any country, and this has enabled them to produce on an average an article which is bound to hold its own in the Markets.

(8). *Vera Paz*.—Guatemala coffee mainly owes the price it obtains in London to its being of very fine quality, and to the supply being short of the demand. The Ceylon price also depends on the shortness of supply.

(9). Mocha is only a name for coffees shipped from Arabian Ports. The produce mostly comes from Abyssinia, which is said to be the original home of coffee. East Indian Cherry coffee (Foxy?) most nearly approaches Mocha of any in appearance, and a great deal of mixing is done with it.

(10). Old Government Java coffee realises some of the highest prices of any coffee. It is obtained by storing the produce of the finest Estates from 5 to 10 years, in specially constructed warehouses, which admit both sun and air; thus the beans do not must, but mellow, and volatile oil is by this means completely developed. The beans after the process are of rich brown in colour. They lose 15% in weight in three years, but further loss in roasting is proportionately less, owing to the beans being so dry, so the Government is compensated for the loss by high prices.

(11). Blue Mountain (Jamaica) coffee commands the highest prices of any coffee. It deteriorated a bit back but regained its lost reputation by growers taking more care in cultivation and preparation and shipping in

parchment for cleaning in England, with the result that more care is devoted to cleaning.

(12). "Quakers," are berries in roast which, without being absolutely pale, still will not by any amount of roasting become the requisite brown. They have, after roasting, an unpleasant odour, and when cracked, one will spoil a whole cup.

(13). "Unclean" is the buyers term for berries of a certain brown glazed hue in the raw which when cut are found absolutely putrid. One in a full dock sample will make a careful buyer reject it. Many theories are given as to the cause of these, but the most likely one is that fermentation has not been stopped at the right time. Possibly they may be beans which have got into some out of the way spot, and so fermented and rotted in the damp for days and then got somehow mixed with the washed bulk.

(14). Too high a retail price demanded for a coffee is bad as, (1st), It leads to more adulteration, (2nd). Other drinks take its place, *i.e.*, Tea, Cocoa, and Coffee substitutes.

(15). The possible reason for the small consumption in England and some other countries is (1) Tea goes so much further than Coffee and so is cheaper. (2) Bad Roasting. (3) Adulteration.

(16). In considering consumption figures of each country, one very often overlooks the fact that imports nominally entered as consumption are often imports from stock for re-exportation. This explains the apparently wide fluctuation in duty free countries and those with a small duty. In heavy dutiable countries the imports agree more exactly with the actual consumption by the population.

(17). As a rule, a buyer buys coffee from his own standard. He therefore picks what he thinks will suit, mostly by its colour and uniformity, etc., then gets the Roast and Taste of these only. When one considers that in a big Market with, say, 400 tons up for sale that day, and most likely samples only obtainable about 4 hours before auction, one can quite see the impossibility of a buyer tasting any but what he considered up to his standard, so that some marks that are not so bright to look at may be passed by, though they might liquor as well as those chosen by the buyer. These, then, will have to take their chance with buyers for a cheaper market who will buy anything at a figure.

(18). Bold coffee price depends a lot on its pleasing the eye, as it is mostly sold straight to the consumer in the raw, who goes by look and size. A big apple looks better than a small one; though the latter may taste best, still the public will buy the former first. So with coffee beans; especially on the continent, where a lot of home roasting is carried out by the public.

(19). Quality of roast depends mainly on: Fat, Sugar, Caffeine and Aromatic oil. The Testa of the bean has a layer of long cells containing caffeine, while the inner substance consists of an assemblage of vessels in the cavities of which is Aromatic oil. On Roasting the oil volatilizes, loss about 8 to 13 per cent., hence the smell of roasting. The sugar is reduced from 6 to 1 per cent. It is not lost, as it turns into Caramel.

(20). On the addition of boiling water to coffee powder, as a rule, only 10 to 12 per cent. of soluble matter goes into solution, though 40 per cent. of the contents are soluble with boiling.

SUPPLEMENTARY NOTES.

I can quite imagine that the majority of Planters on reading these notes will remark, what is the use of us taking all this trouble on the Estate if the Mills are going to ruin the colour of the beans during the Coast Curing? To

these I would reply, read my notes *re* "there not being any Mill in the Market that will deal with bulk better." Also, do they not think that if the Curers knew of any means to improve matters, they would introduce the same, and at any rate cure their own private coffee by these means, in which case marks of Estates owned by them would show up on the London Market? I found the Curers, as a whole, were just as keen as the Planters in getting good prices, in fact, it struck me that they were more keen and had tried numerous experiments with new machinery, etc., which I doubt if any Planter has done. May it not be that our Estate drying grounds are behind the standard of those in other countries, and that the defect of much of the Indian coffee is due mainly to the imperfection of the Estate Curing, and want of machinery to carry forward such processes as washing, drying, etc., which would lead to more thorough washing and even drying, and thus, by obtaining uniformity, the beans when sent to the Curers, would have less chance of coming to harm in the Peeler, and what colour was lost would be slight when compared with an uneven dried and badly washed batch?

But one may argue that years back good prices were obtained by the present methods. This is true, but then I expect it was a matter of demand regulating prices, whereas now I should not at all wonder if the reason other countries have been able to produce a finer article is that they do most of their Estate drying-ground work by the aid of machinery, thus getting a more uniform article, and so in a Market which is overstocked their article commands bigger prices, and buyers have gone for it in preference to East Indian, as the latter is not so well prepared. In fact, since the Market has become overstocked the standard of the article wanted has been raised. I do not believe when Brokers complain that East Indian Coffee shows poor quality they mean wholesale deterioration, but that the bulk shows a lot more inferior beans than the article on which they now base their standard.

What the buyer wants is coffee that all roasts evenly, so that some berries may not be turned to charcoal during the process, and ruin the whole roast by taking up Aroma, which charcoal does. The even way Pea-berry roasts is one of the reasons it fetches good prices. Now a uniform coloured coffee will generally roast evenly, and one of bluish colour will give better liquor than that of say a grey colour (given they are both of the same approximate dryness when put in the roasts.) Still I doubt if the amount of colour lost in milling (as is the case with all grain), means that the Coffee would roast or liquor any worse than the same coffee if it had been hulled by hand; but let a certain amount of inferior or unevenly dried beans be mixed with either the milled or the hand-rubbed sample, and you will find on roasting that they will show up.

Hand-rubbing, or stamping out with feet, introduces a certain amount of moisture into the beans, thus brightening the colour, but it does not last long.

The value of coffee depends on the form of the beans, their size, colour, smell, flavour, age, and uniformity. Much difference exists between coffee of one Estate and another, dependent very largely on processes of manufacture, and care bestowed in drying, sizing, and packing. Colour seems to depend more on the degree of ripeness when collected, and the care taken in preparation, than on the nature of the soil, or the class of coffee grown.

One may find phenomenally high prices for a mark one year, and then the same mark for years may drop into the ruck. May it not be that in the year high prices were obtained, the berries were very uniformly fermented and washed well, and dried evenly, whereas the next season the berries were irregular in size, and fermenting and washing was troublesome, so

that some beans had still come saccharine matter left on them when removed to the Barbecues, and so after drying were uneven? Thus the mark turns out badly in the market, and goes on doing so till it gets another, what one might call, Vintage year, when everything is favourable. I do not believe trees have deteriorated nor the fruit on them, but that in some seasons the berries are very mixed in size, and this, as pointed out, would make the process of preparation very uncertain without mechanical means. One cannot ferment by machinery, but an even washing, and subsequent drying, could be done by it, even if coffee was very irregular in size.

I have heard arguments put forward to prove that our quality has nothing to do with Estate preparation, such as (1) "why one man did not wash his coffee at all, but put it straight on to the Barbecues, and then got very big prices; better than he had ever done before." Possibly! But this does not prove that still higher figures would not have been obtained if it had been washed. (2) Even drying. "Why B dried hardly at all, and sent down stuff fermenting in the bags, and got grand prices." Possibly! But Curers had to do the drying for him and with their drying grounds most likely got an even one. B would most likely have got higher prices still by doing part of the drying himself, and less Triage. (3) "Winnowing parchment before sacking, what rot!" Possibly! But how about dust, stones, and sticks in bulk; why give Curers extra trouble?

In contrast to the above, watch some marks on whose drying-grounds fermenting is an art, washing very thorough, drying done off very even Barbecues, cocoanut matting or ground as level as a Tennis ground, and I think you will note that the prices obtained yearly by these are above the average; and I expect you would find that the percentage of triage also is small. This seems to prove my contention. May it not be that a still further move by the introduction of machinery would better this?

I had it suggested to me by a man now dead who in his time had been a Planter and Curer, besides having a high knowledge of chemistry, that as coffee from different parts of a big Estate differs considerably in size it might pay to size it before fermenting, so that medium and small beans passed into different vats, then each lot would be prepared separately. The reason given was that in a mixed lot of beans, beans of the same size or nearly so, would be likely to ferment, wash, and dry more evenly. This idea to me at first sight seemed impossible to carry out on big Estates, but he pointed out that given the vats, and mechanical sieves attached to the Pulper, it would be easy enough.

All ideas in Estate Curing are worthy of trial till proved that no benefit is obtained by them. The subject is one, however, that is capable of definite verification, and one moreover that it would seem should be solved by every Planter for himself. Experiments carried out for a few years might enable Planters to find out if the standard of quality on the Estates can be raised, and the beans turned out yearly kept at that quality. It is not likely that any two Estates will have the same standard, still this is no reason a coffee Estate should not be known by its quality. Plucked leaves of tea must differ as greatly as coffee, berries do, and as with tea everything depends on after preparation, is it not possible this may also be the case with Coffee.

No Planter is ever contented with his prices, or likely to be, as every one thinks his product as good as another, and it is only when he finds the buyer is quite prepared to go elsewhere, or else give a very low price for any but the best quality of East India, that he realises that his mark has something wrong with it. As with all fancy articles, the buyer always buys only the best of the kind, at a fairly high rate if he wants that particular

kind. Otherwise if the quality is below what he wants, he will look elsewhere to fill its place.

Quality must have everything to do with price, as a good quality coffee always fetches a fair average price, I mean one which is governed by the demand for a particular standard. The Chick marks of Mysore this year (1904) are not above the average price fetched for several years by that coffee, which clearly proves that the buyers find that quality has kept the standard they want, and so are willing to pay average prices. If the quality should for any reason drop, I expect one would find prices would drop also.

During the last years of eighteen-hundred, and the first years of nineteen hundred, the majority of Planters have first been stopping one work, and then another, saying they did not think them needful. For instance, in some places no pruning is done. I expect by this means for a few years, if a system of heavy manuring is kept up, heavy crops will result, but it will mean later on that the trees will have to keep a lot of wood in sap which would not be there if pruning in the hot weather had been carried out. I think the result of this will most likely be that it will be found that trees, though they show a heap of wood, will not have sap sufficient to keep both this growing and sustain the extra fruit also, with the result that a lot of blossom will fail to set and there will be dying back of wood after three or four years. Then the old system of soil cultivation is being done away with, and this will lead to a massing of roots in the surface soil and consequent breeding of diseases. One cannot bring any fruit tree up to a high state of growth and then let it revert to nature without its losing some of its qualities, and though one may not notice for a few crops any failing off in quality of fruit, still it is bound to show up later in the more mixed sizes of berries, and increase of inferior fruit. Now, there are two ways of growing fruit trees: one for quality, and the other for quantity. If planters are going to grow for the latter, they must be prepared to accept prices accordingly.

The remarks on the samples of some of the best East Indian sent to St. Louis Exhibition show that this class of coffee is deteriorating, or else other countries are producing as fine an article. Mr. Flank remarks; "They have placed their own valuation on their product, and their valuations are far above similar 'drinking coffee in this Market. They have practically lost the benefit of advertising their coffee at the World's Fair by these prohibitive values of prices."

Mr. Blechynden remarks: "The consigned coffees were valued in the invoice at 70s. per cwt. c. f. i. New York, but individual lots were valued separately, and the prices ranged much higher than any coffees sell for in America."

Both these remarks point to the Mysore product being only a fancy article in the London Market and, to judge by present prices, only then if it is up to a certain quality, which quality seems to be falling off, possibly for the aforesaid reasons.

Mr. W. Newburgh Tisdall, in the course of a two-minute chat with a representative of the *Ceylon Observer*, recently, mentioned that he had visited the properties of the Periyar, Cochin, and Rani Travancore Rubber Companies, and three private places, the names of which he was not at liberty to mention. He had found the rubber in very good condition and growing exceedingly well. Yields would probable equal anticipations and might exceed them.

From the investors' point of view he thought South Indian rubber was a very good thing.

DISTRICT PLANTERS' ASSOCIATIONS.**Wynaad Planters' Association.**

*Proceedings of a General Meeting held at Meppadi Club on
December 14th, 1910.*

PRESENT :—Messrs. Bissett, Ewart, Fleury, Halliley, Howland, Mead, Powell, Trollope. **Visitors**.—Messrs. D. Ewart, Gillatt, F. Winterbotham and Whitton, and C. E. Abbott, Honorary Secretary.

Mr. Powell in the Chair.

1642. *Proceedings of last Meeting* were confirmed.

1643. *Poodapardy Hotel*.—Read letter to Chungaren. Read correspondence with Superintendent of Post Offices, Calicut. Recorded.

1644. *Thefts of Tea and Proposed Act*.—Read correspondence, and Honorary Secretary's note.

1645. *Ceylon Import Duty*.—Read U. P. A. S. I. circular 56/10 and Honorary Secretary's reply. The Meeting considered that the present is not a good time to press the subject.

1646. *New System of Voting and Subscribing*.—The Honorary Secretary was instructed to issue a circular to members inquiring about acreage to be assessed in 1911. This is to include all land planted in 1910, but not land now being cleared for 1911 planting.

1647. *Mysore Planters and Scientific Officer*.—Attention was called to Proceedings of South Mysore Planters' Association of November 10th and 11th, copies of which have been received.

1648. *Roads*.—Read letter from Honorary Secretary to District Board Engineer, and reply stating with reference to closing of Road 5 for repairs, that in future (with the permission of the Secretary) notices will be put up in the Malabar Club and sent to the Wynaad Planters' Association. The Meeting thanked Mr. Blake. Read letter from Mr. Malcolm, the Representative of the Association on District Board, with reference to para. 1618, and Honorary Secretary's reply. Noted.

Road 35 B.—Read letter from Mr. West. The Honorary Secretary was instructed to write to the District Board about the dangerous state of the diversion at the Noolpoya bridge, and to inquire for further details from Mr. West.

1649. *Deputy Collector of Wynaad*.—Read letter from Rao Bahadur C. Gopalan Nayar informing Association that Mr. P. Krishnan Nambar has been appointed to act as Deputy Collector.

Read letter from Mr. Winterbotham and Honorary Secretary's reply. Recorded.

1650. *Papers on Table*.—Notice that a reward of Rs.10 will be given for destruction of wild dogs. Notice as to sale of minor products (pepper, coffee and grass) on Government lands in Muppanad at Meppadi on December 20th. G. O. appointing Mr. W. A. Fleury as attesting officer under Act I. Indian Tea Association circulars.

A vote of thanks to the Chair terminated the Proceedings.

(Signed) S. H. POWELL, *Chairman*.

(„) C. E. ABBOTT, *Hon. Secretary*.

TEA.**The Cultivation of Tea Soil.**

Bulletin No. 5 of 1904, issued by the Indian Tea Association (Calcutta), comprises a "Note on the Cultivation of Tea Soils," by Dr. G. D. Hope, the Scientific Officer of the Association. It is a general treatise on the modern knowledge now possessed regarding various soils, the improvements in fertility which can be accomplished, and the importance of keeping up-to-date. At the end of his pamphlet Dr. Hope says that "the extent and nature of pruning best adapted to preserve the moisture in the soil and at the same time to allow of full benefit from sunshine is a question closely connected with our present discussion;" and he proceeds to sum up the practical conclusions arrived at as follows:—

1. It is of primary importance to improve the tilth of the soil. The proper supply of water to the roots of the bush depends largely upon this. Good tilth cannot always be produced by cultivation alone, although it tends very much in this direction, especially on heavy soils.

2. Sandy light soils can be improved by addition of organic matter or of soil of a heavier texture. Deep cultivation and trenching is sometimes necessary in order to break pans! Heavy soils stand in need of thoroughly good cultivation. This should not be given when the soil is in a very wet and sticky condition. Addition of sandy soil improves the texture of heavy soils.

3. Surface cultivation is necessary to prevent loss of water from the soil during the cold weather. The reasons for doing so are two:

(a). Jungle is removed, and this prevents loss of water by transpiration.

(b). A mulch is formed, this also prevents undue loss of water from the soil.

4. The sun's rays probably play an important part during the cold weather in increasing the fertility of soils; a clean surface of soil should therefore be exposed to the sunshine.

5. It is important to bear in mind the reasons, mechanical, chemical, and biological, which underlie the practices of the cultivation.

Tea In Java.

In a Java "Supplement," issued with the *Financial Times* recently, dealing with the position of British enterprise in the Island, there is the following reference to tea: "One of the most interesting cultures is tea, and the success of the Java Tea Estates must largely be attributed to the suitability of the soil, and to the cheapness of labour. Following are the figures for imports of tea into London from Java, showing a very satisfactory increase during the past few years: 1907 to 1908, 10,571,000 lbs.; 1908 to 1909, 13,450,000 lbs.; 1909 to 1910, 14,500,000 lbs. Some Dutch-owned tea estates pay dividends up to as high as 69 per cent. A few recent dividends may be of interest: Wanasoeka, 29 per cent. for 1909, 10 per cent. interim, 1910. Malabar, 20 per cent. for 1909: 10 per cent. interim, 1910. Perbawatie, 15 per cent. for 1909: 8 per cent. interim, 1910. These Java teas are fetching exceedingly good prices, sales recently in Batavia from Bodjong-Terong Tea Estates realising: Dust 5½ per lb.; Broken Tea 6½d.; Broken Pekoe, 7½d.; Broken Orange Pekoe, 7½d.; Pekoe Souchong, 7½d.; Orange Pekoe, 8d."

RUBBER.

Ceará Rubber.

In the course of a paper on the subject of "Rubber Production Fifty Years Hence" Mr. H. Hamel Smith writes in "Grenier's Rubber Annual 1910":—

Whilst comparing the characteristics of the various rubber-producing vines and trees in the glass-houses at Laeken, near Brussels, with Prof. Warburg, he advanced the theory, which is shared by many planters, that, in the not too distant future, rubber-planters, taken as a whole, will devote their attention entirely to Pará (*Hevea Brasiliensis*) and Ceará (*Manihot Glaziovii*) rubber. Pará rubber will be cultivated wherever climatic conditions and the class of labour available permits, and Ceará rubber will be grown elsewhere where it is too dry for the Hevea tree to come to maturity or to yield freely. . . .

Possibly we could still learn, with advantage, a great deal more about Pará rubber, although thanks to the Government reports we know a great deal, but with Ceará, Castillioa or Funtumia we know hardly anything. More than once we have been promised books on Ceará and Castillioa, but they have still to come. . . .

What we badly want to find out, before Ceará can establish its claim to be one of the two chief rubber producers, is (1) What yield we can safely expect per tree? (2) At what distance apart ought the trees to be planted? (3) The best method of extracting the latex. (4) Whether the yield per tree can be increased and made more certain and regular than now seems the case, either by removing an excess of tubers at the roots, or by higher cultivation and judicious manuring to increase the tubers? Here are four queries of the highest importance to the Ceará planter, which at present are unanswerable. Meanwhile we are told that the East African estates are too closely planted—but no one says what the distance should be.

As regards the yield, some old Ceará trees in North West Ceylon have yielded 2 to 8 lbs. per tree, whilst in Hawaii, according to Bulletin No. 16 of the Hawaii Experimental Station, the trees give 5 to 10 lbs., of crude rubber in the year. From this, we can probably take it that under favourable circumstances, the Ceará trees on an average, should give, at 8 to 10 years old, at least 2 lbs., per tree in twelve months, if scientifically tapped to best advantage. In the Bulletins of Miscellaneous Information issued by Kew, in 1906, is one on the known "Rubbers" giving their names, habitats, and other information, a most useful book costing but eighteen pence, that I always keep by me.

On page 130, this book speaks of the Ceará tree as living a comparatively short time, even when carefully tapped, as we are told "under this system the tree is said to live for 15 to 20 years." This seems to me a very little time. The tapping system mentioned, is to tap each tree 80 days in the year, divided by an interval of about three months, into two periods of forty days each.

The average yield of Ceará trees is reported to be from $\frac{1}{2}$ to $1\frac{1}{2}$ kilos (1 to 3 lbs.) a year.

In the summary on the reports sent in on Ceará, the book says:—

" . . . only with large areas can one hope to make the industry a paying one."

It produces a good class of rubber, second only, when well prepared, to the best Pará. The yield, per tree, is apparently small, but a return is

obtained earlier than from any other rubber plant. With thick planting and judicious thinning, as the trees grow up, it may be possible to increase the yield hitherto recorded.* In many of our Colonies, possessing a dry climate, and a poor stony soil, it is possible that large areas could be profitably occupied with Ceará rubber trees, so grown as to provide annual crops for tapping."

Undoubtedly there is much uncertainty and diversity in the yield of Ceará trees, produced under similar conditions and even growing side by side. Hence how can one guarantee "favourable conditions" as mentioned in the Hawaii Bulletin—when this is the case. If the yield is not 5 to 10 lbs. per tree, the planter is not satisfied to be told his land or conditions are not favourable. The only thing he will trouble about is how to make them favourable. Owing to this uncertainty of yield, old planters warn us to watch the estates as one would a herd of cows, and to "spot" and weed out the poor milkers. When doing so the trees should be carefully removed and the tubers examined, the soil also, to try and ascertain the cause, or to note similarities between the poor milkers, with a view if possible of remedying the defects. For instance, removing some of the tubers might and should cause more nourishment to go to the tree and so by increasing its vigour, help to improve the yield; on the other hand trees poor in tubers should be replanted experimentally in good soil and "fed up," to see if that will increase the tuberous growth and whether doing so will help to stimulate the supply of latex to the cells up in the trunk.

Hawaii has already proved that the immediate yield of Ceará trees can be increased by the use of Nitrate of soda, and experiments carefully carried out, may both increase the yield of bad and good milkers alike. All this is most important to ascertain, if as we are told Ceará is to play an important part in the producing world, for unless the output can be assured, the tree, far from coming out second on the list, will get bad marks put against it and be relegated to the bottom. So far except in Hawaii little or no experimental work has been carried on but this should be done at such centres as Southern India,† North-east Ceylon, Central and East Africa, etc., where the cultivation of Ceará rubber seems likely to be a marked success.

As regards tapping, when it should be done, and how it should be done, I cannot go into that now as I meant to. I can only say that in Hawaii, and also in British East Africa, I am told by actual planters who have given up the other methods that the herring-bone system is proving perfectly satisfactory, the latex running, possibly with the aid of drip-tins, sufficiently well to avoid waste.

[* Note by Author.—This theory does not seem to me a sound one. In practice it has done the Castilleja men in Mexico no good, and probably much harm. What is the good of spending money in planting trees to cut them out later on, and leave rotting roots in the ground.]

This is of special importance in India where Stump Rot is prevalent, which, as pointed out on several occasions by the Scientific Officer, readily attacks Ceará.—Ed., P. C.]

[† A number of experiments have been organised by the Scientific Officer and the Experiment Committees in the Ceará growing districts to test the best methods of tapping and the yielding capacities of Ceará and the possibility of increasing the latex flow by applying Nitrate of Soda.—Ed., P. C.]

Java Rubber.

Java Rubber—was formerly shipped in various shapes such as block, ball, scrap, biscuit, etc. Preference was given to the block form until it was pointed out by some one that the rubber most in demand was thin and almost transparent sheets which enabled buyers to gauge the purity of the article. The advice was accepted until lately, when a visitor to the Singapore Show returned with information that to send rubber in blocks was far simpler and easier.

OFFICIAL PAPERS.

Planting Products, &c., in Coorg.

From the "Report on the Administration of Coorg," for the year 1909-10, it appears that the outturn of Coffee was fully up to the average, and fair prices were obtained in the European market. "The areas cultivated according both to European and to local methods continued to shrink, but it is probable that the portions passing out of cultivation are too poor materially to affect the total outturn.

The extent recorded as actually cultivated with coffee, *viz.*, 43,421 acres, declined by 895 acres on account of the abandonment of deteriorated gardens. The gross area held under the coffee tenure was 99,650 acres, which includes (a) 9,356 acres of ryotwari cardamom malés, (b) 1,893 acres of orange gardens, (c) 42,452 acres of abandoned coffee or land granted for coffee but not planted, (d) 2,528 acres, planted with rubber, and (e) 648 acres of immature coffee. There is thus a net area of 42,773 acres of coffee in bearing, of which 38,726 acres are cultivated according to the European method and 4,047 acres in the Native Style. In addition to the area shown under (d) *supra* 819 acres are cultivated with rubber and 135 acres with *agave*.

The 4,582 acres shown as under "orchards and garden produce," consist of 293 acres of arecanut and cocoanut and 4,289 acres of orange groves. The latter figure includes the 1,893 acres referred to above. The cultivation of pepper on lands held under the coffee tenure is progressing.

The estimated total produce of coffee was 4,200 tons, compared with the low outturn of 2,532 tons in the previous year.

The planting of *Ceari* rubber on areas formerly occupied by coffee went on slowly in South Coorg, and during the year a commencement was made to open a rubber estate on a more important scale below the ghâts west of Mercara. The land taken up is evergreen forest lying only some 700 feet above sea-level. This enterprise appears likely to succeed, and the results will be watched with interest.

The cultivation of oranges showed an increase of 400 acres. It is believed that an advance also took place in the plantation of pepper, but no separate statistics have been recorded. The area actually under cardamoms is not known with any approach to accuracy, but it is estimated that of some 68,000 acres of forest land held for this cultivation under 2,000 acres are productive.

Lantana.

The progress made during the year in the eradication of *lantana* is summarised as follows:—

- (a) 2,949 acres of *lantana*-covered land were newly cleared,
- (b) 19,125 acres of the area formerly cleared were kept clear,
- (c) One more village—making 88 in all,—was declared clear,
- (d) 151 *lantana* concessions were granted, bringing the total for the four years up to 1,433.

The points to which special attention will be paid in continuing the campaign are (i) to secure the removal of regrowth from the land which has been cleared during the past four years, (ii) to insist on clearance of the shrub from each náid head-quarters as a centre, (iii) to check the spread of *lantana* by the eradication of scattered growth, and (iv) to insist on strict compliance with the conditions attached to concessions.

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Indian Institute of Science.

The Corner Stone Laying Ceremony of the Library Building of the Indian Institute of Science, by His Highness the Maharaja of Mysore, is fixed to take place at 5 p.m. on Wednesday, the 1st February 1911.

As the Indian Institute of Science is designed to serve all India, this event will not be without interest to members of the planting community.

Germination of Manihot Seeds.

In the *Ceylon Observer* attention is called to a letter from "a gentleman well acquainted with the germination of many kinds of seeds," who writes as follows:—

"With reference to the extract from the *Planters' Chronicle* in your issue of 7th instant Mr. Hamilton, of the U. P. A. S. I., makes an interesting statement regarding the germination of *Manihot* seeds. After 'experimenting largely with this seed' Mr. Hamilton found that 'the percentage of germination depends almost entirely upon its freshness. If it is quite fresh, it will germinate; but if it is old and the kernel is waxy, no filing, soaking in hot water, or any other dodge will make it grow, and its only use is for eating purposes.'

It is generally agreed, however, in German and British East Africa where *Manihots* (especially *Manihot Glaziovii* or Ceará rubber) are somewhat extensively cultivated, that *old seeds* are always preferred for sowing purposes. In the *Agricultural Journal of British East Africa* for April 1908, Mr. Powell, in charge of the Economic Plants Division, recommends Ceará rubber seeds about two years old for sowing; 'they should be at least a year old, fresh seeds being of slow and uncertain germination.'"

The *Ceylon Observer* remarks that the opinion quoted from East Africa has independent confirmation from Mr. Jared G. Smith, Agent in charge of the Hawaii (Sandwich Islands) Experiment Stations. In *Bulletin* November 16th of the Experiment Stations Office U. S. Department of Agriculture, issued in July 1908, Mr. Smith says:—

"The Ceará rubber seed coats are hard and stony. The seed retains its vitality for two or three years or more, and is apparently more readily germinated when at least six months old than when fresh from the tree." And again:—"The natural germination of the Ceará rubber seed requires about a year because of the very thick, hard, waterproof seed coats."

It should be remembered, however, that Mr. Hamilton's observations had reference to the "new" *Manihot* Rubbers, not to Ceará, though that also belongs to the *Manihot* family.

International Rubber and Allied Trades Exhibition.

The India Rubber World (New York) \$1,000 Cup, which is being presented by Mr. H. C. Pearson, of *The India Rubber World*, for competition at the above Exhibition, is described in the following terms :—

This Trophy of silver is a cup fifty inches in height and is of most artistic design and workmanship. The stem of the cup represents a trunk of the *Castilloa elastica*, beside which is depicted a man with a rubber-tapping knife in one hand and a calabash in the other, tapping the tree in the destructive manner common to wild-rubber gatherers. The upper part of the tree terminates in a cluster of *Castilloa* leaves, which hold a vase, graceful in form, the centre panel bearing the inscription :

"The India Rubber World Trophy, for the Best System of Extracting Latex from the *Castilloa Elastica*. International Rubber Exhibition, London, 1911."

The middle of the border, at the top, shows a raised hemisphere of the countries in which the *Castilloa* thrives. On each side is a frieze of planted *Castilloa*. The Trophy, in American butler and French grey style, represents a value of \$1,000, and the well-known silversmiths, Dieges and Clust, New York, are the makers. The Cup is offered specifically for the solution of the *Castilloa* problem. It is well to remember, however, that if this is satisfactorily solved, a new value will be placed upon the sapiums, funtumia, fucus, gutta perchas of all kinds including jelutong as well as *Castilloa ulei*.

CONDITIONS OF THE COMPETITION,

1. The award is to be made for the best process, method, tool or appliance, for extracting the maximum amounts of Latex from the *Castilloa Elastica*, without permanent injury to the tree.

2. There will be no entrance fee.

3. Entries may be tools or appliances together with full description or drawing accompanied by descriptions.

4. Tools, appliances or drawings submitted for competition will be assembled as one exhibit, known as the India Rubber World Rubber Competition.

5. The cup will be the absolute property of the successful contestant. It will be presented to the winner (or his accredited representative) at the International Rubber Exhibition Dinner, to be held in London while the Exhibition is in progress.

6. The Judges have the right to test every tool or appliance.

7. Tools, appliances and drawings will be returned to the owners or representatives at the close of the Exhibition.

8. While the management of the Exhibition will scrupulously protect the exhibits, they will not be responsible for loss or damage from any cause.

9. The Judges' decision shall be final, and the entries will only be accepted on this understanding.

10. All entries must be made to the Awards Committee, International Rubber and Allied Trades Exhibition, Ltd., 75 Chancery Lane, London, W. C. by Monday night May 1st, 1911. Letters bearing postmark May 1st will be accepted as entered at the office on that date. Entries should be sent by registered post, or be delivered by hand, so that a receipt may be given for them. Exhibits for competition must be sent direct to the Awards Committee, Royal Agricultural Hall, Islington, London, N., but should not reach that building before June 15th and not later than June 20th. Transportation must be paid on all Exhibits.

The Exhibition opens June 24th and closes July 11th, 1911.

Scientific Officer's Papers.**XL.—TOUR IN SOUTH MYSORE.**

Leaving Bangalore on 30th November, I made a short tour in South Mysore, visiting a number of Estates, and lecturing before a Meeting of the local Planters' Association at Saklasapur on 10th December.

One of the main objects of my visit at this time of year was to study the question of the quality and curing of Coffee, but this is a subject upon which I have little to say in this report. It is a very involved and difficult subject and needs close study, and a number of carefully conducted experiments made by a man on the spot. Recently a valuable contribution towards our knowledge of the subject was communicated to the *Planters' Chronicle* by a planter who has spent much time in studying it. Mr. Graham Anderson has also kindly placed in my hands a collection of his articles on the subject written from time to time.

One point stands out prominently from both these sources of information, and that is the importance of even drying. Mr. Anderson says, "Unevenly dried parchment is one of the greatest misfortunes, as a uniform condition can never be obtained after bulking has been carried out, and consequently before milling can take place some of the coffee will be greatly overdried so as to prevent a proportion of the lot being crushed, or rendered pale, by the weight of the roller." E. W. R., in the *Planters' Chronicle*, (Vol. V, p. 655) gives the advice, "Dry as evenly as possible. By evenness is meant, get each bean as near the same state of dryness as possible. The great thing in order to get the best results with an Edge Runner is an even and thorough drying, and an unevenly dried coffee turns paler than any other during peeling." Again he says, "One has only to see a big consignment arrive on the coast, classified as dry at average weights of say 31 lbs.; if women were put on to pick over a certain portion one would find they could get bushels at 33 and 29 lbs. odd, though the average would still be 31 lbs. This is what Curers mean by uneven drying."

This is undoubtedly the case. During my tour I took a sample from dry parchment weighing 31 lbs. to the bushel. Two series of beans were picked haphazard from this sample, and the moisture in them was determined in my laboratory with the following interesting result:—

Bean.	PERCENTAGE OF MOISTURE.		Bean.
	Series I.	Series II.	
2	10'2	10'1	8
9	10'2	10'1	4
10	9'9	9'96	2
3	9'85	9'9	9
1	9'8	9'9	10
6	9'78	9'5	6
5	9'5	9'2	5
8	9'5	9'15	1
4	9'2	8'95	7
7	5'6	8'8	3

Ignoring No. 7 of Series I, which was probably abnormal in some way, there is a difference of 1% of moisture between the driest and the wettest bean in the first Series, and of 1'3% in the second Series. Hence though this coffee was dried down low, 31 lbs. per bushel, individual beans are unequally dry.

I believe that the advice given by E. W. R. is very sound indeed, when he says, "I believe that if coffee was dried down evenly to say 33 lbs. on the estate, or any weight which would allow the Curer to do the slight finishing of drying on the coast it would have more chance of going into the peeler in an evenly dried state." There seems to be little doubt that the Edge Runner does damage the colour of unevenly dried coffee; therefore, "Do not

mix lots of coffee if not of the same degree of dryness. Send them down marked separately."

The difficulties of drying evenly are great, and no doubt, as Mr. Anderson says, "the drying of coffee must be conducted in accordance with its density or specific gravity. All coffees, most certainly, cannot be dried in the same way."

I have arranged for a few tentative experiments in methods of drying to be tried, but really this needs the constant presence of the investigator if any really reliable results are to be obtained. Probably the coffee after a preliminary drying should be dried rapidly, and I suggest to planters that they should seriously consider the possibilities of artificial drying in a machine where each individual bean is subjected to exactly the same process.

The subject will not be lost sight of, and I hope that in the near future facilities will be given me to undertake some work upon it along definite lines of research.

Last season I suggested a number of experiments which might be made with a view to the prevention and control of Black Rot. These, however, as far as I can ascertain, have not been carried out. I am inclined to think that this disease could be largely prevented by the means which have proved so successful in the case of Pink Disease of Rubber. Just before the monsoon breaks the patches which are usually attacked by Black Rot should be handled, the stems scraped, and painted by means of a brush with Bordeaux Mixture. I hope that this method will receive a thorough trial during the coming year, and the cost of the process ascertained as well as its benefit. Such patches should at the same time be drained systematically, and the shade lightened as much as possible and, in fact, everything should be done to reduce accumulation of moisture, and to prevent the mist hanging in them during the heavy monsoon period.

I would refer planters in S. Mysore to what was said about Stump Rot in my report on my second tour in Coorg (*P.C.*, Vol. V, p. 562). Undoubtedly this disease has done, and is doing, a great deal of harm in Coffee, especially to old trees and on land which is run down.

The influence of the admixture of coffee picked from patches of shuck coffee, attacked by Stump Rot or otherwise diseased, on the general deterioration of the estate sample is a point worthy of consideration, and I should advise those who have any considerable area of such patches to keep the coffee from them separated from the main bulk.

High cultivation will no doubt do much to prevent disease getting a firm hold of the trees, but other precautions must be adopted as well. When patches have reached the stage at which the trees have shed their primaries and lost their frames no amount of high cultivation will do more than prolong their lives. Such patches should be isolated and taken in hand systematically, and it is important to deal with them when they are small. When a tree near an old stump dies, attacked by the form of Stump Rot with which every one is familiar, it, together with the stump, should be at once removed and the spot dug and thoroughly limed. These bad patches all began originally in this way and are the results of past neglect.

It must be carefully borne in mind too that Ceará rubber is very susceptible to Stump Rot; trees dying of it may be seen in many Ceará clearings. Such trees should be *at once* attended to. This disease has an important bearing on the thinning out of Ceará. In most places close planting has been adopted and the time has come, or will soon come, when some 50% of the trees must be removed. When this is done the old

stumps must be pulled out and destroyed, or troubles from Stump Rot are certain to arise. Each year the small and weakly trees, overshadowed by their neighbours, should be tapped to death and then uprooted and burned, until the requisite number per acre have been obtained.

So far as Coffee is concerned there are decided limitations to the use of any direct preventative methods of controlling disease, such as spraying, and direct methods of control, such as rotation of crop, are ruled out of court, and as a natural consequence we are forced to adopt other methods and seek for disease-resistant varieties. Much good work has been done in Mysore with a hybrid between Arabian and Liberian coffee, and this has been frequently referred to in the *Planters' Chronicle*. When Stump Rot patches are replanted, I strongly advise the planting of these hybrids. They have proved themselves to be big vigorous plants, yielding big crops and a bean valued at as high a price as ordinary Arabian, and most important of all they are disease-resistant to a high degree. Even in the best coffee a hybrid catches the eye at once, and stands out head and shoulders above its neighbours as a healthy vigorous plant.

It is hoped to produce other and still better hybrids in the future, and facilities for conducting experiments and breeding coffee will very probably be obtained on a special plot of land in the Nilgiris. In the meanwhile the existing hybrid should be widely planted, propagated, and cultivated.

With regard to manuring, there is a possibility that too much Nitrogen is being applied, and the trees thus induced to make wood and leaf instead of flower and fruit. Undoubtedly many fields do require Nitrogen and humus, but well established fields with a heavy surface mulch which are annually given doses of Nitrogenous manures such as Poonac and Fish may be getting an over stimulus of Nitrogen, and it may be advantageous to reduce this and apply Nitrogenous manures less frequently.

I put forward this view with great diffidence, since it means changing a long established plan and upsetting an old precedent. However, experiments are being conducted to ascertain how much Nitrogen is being supplied annually by the mulch provided by the coffee leaves and the leaves of the shade trees, and to discover what the results of the manurial experiments conducted by Dr. Lehmann, which showed in every case that the so called 'Unmanured' plot gave as good, or better, yield as the manured plots, really mean. It must be remembered that these plots were not really unmanured, but annually received large doses of nitrogen from the mulch.

Poonacs yearly become more expensive, and the nitrogen bill is a serious item, and this being so, more care should be taken to conserve the 'natural manure' of the estates. Coffee pulp can with care be made into a most valuable compost and take the place of a certain amount, if not all, of the poonac.

Pulp in its dry state is of equal value with good cattle manure. The following figures for Pulp are calculated from Hughes' analyses, and the figures for cattle manure placed by the side of them for comparison are given as representative of the composition of a good cattle manure made at the Koilpatti Agricultural Station :—

PULP.			CATTLE MANURE.		
		Calculated to a dry state.			Calculated to a dry state.
Moisture	...	78'3	...	55'5	...
Organic Matter	...	19'8	91'0	16'7	39'62
Nitrogen	...	0'33	1'32	0'53	1'26
Phosphoric Acid	...	0'88	4'05	0'34	0'79
Potash	...	0'08	0'37	0'96	2'35
Lime	...	0'13	0'6	...	...

The compost should be made in a cement tank, or pit, and not in heaps which are exposed to weather and from which liquids can drain away. The cost of such a tank will be saved in a year or two by the increased value of the manure made in it. Each day's pulp, after being allowed to drain, should be spread in a layer in the tank and all refuse of the estate yard, cattle droppings, line sweepings, ashes, weeds, etc., should be added to it and then a layer of soil. This should be done day by day till the tank is full. If a layer of bone dust is also added from time to time so as to add about a cwt. of bone to each ton of the compost it will be better still, and its phosphoric acid content, which is low, brought up. When full, a good layer of soil should be placed on the top and a pandal built over it to shelter it from rain and sun, and it should be allowed to rot down. No Lime should be added; when finally rotted the compost will not be acid. I have arranged for a compost to be made in this way, and a sample of it will be taken and analysed and the result published in the *Planters' Chronicle*.

Since my last visit a number of experiments have been begun with various Leguminous plants, and these are quite satisfactory as far they go. They will be continued, and it is hoped to be able to publish shortly some figures relating to them. A difficulty has been experienced in establishing the plants among coffee, but time alone is required and a preferential weeding or two at the beginning of the monsoon, the plan adopted in Wynaad. (See *P. C.*, Vol. V, p. 487).

While on the subject of Leguminous plants it may interest some planters to know that, though not suitable for a cover crop for coffee, the handsome yellow flowered creeper known as 'Ghaut Creeper' to be seen at the Chikkanhully and Angadi Bungalows is *Hexacentris mysorensis*, R. W.

It remains for me to convey my hearty thanks to the Honorary Secretary of the South Mysore Planters' Association, and to the planters of the District generally, for their hospitality and kindness during my tour, and to the local 'Clerk of the Weather,' whoever he may be, for the delightful climatic conditions which I experienced.

RUDOLPH D. ANSTEAD,
Planting Expert.

PARA RUBBER-SEED OIL.

The *Chemist and Druggist* states that attention is again called to this article of future commerce in several papers owing to the shortage of linseed oil this year. The amount of rubber seed now practically wasted is very large, and some addition to the profit of the industry might certainly be made from the seeds. On clean weeded estates, in the season it should be possible to gather or sweep up the seed at a comparatively small cost and supply it to the oil-mills, where it could be crushed and the oil extracted, the residue being made into oil-cake. The great scarcity of linseed oil is causing much anxiety among consumers. The paint trade has been making a large use of substitutes, but for wagon-sheet-making, oilcloths, etc., nothing can take the place of linseed. The present quotation for linseed is higher than it has been for twenty years, and 100 per cent. higher than this time last year. The failure of the linseed crop and the occupation of many of the mills in soy bean crushing seems to be the causes of this rise in price. Now, it seems, would be the time to put Pará seed oil on the market as a substitute for linseed.

INDIAN TEA ASSOCIATION, CALCUTTA.

Extracts from Proceedings of a Meeting of the General Committee held on the 6th December, 1910.

Correspondence with the Indian Tea Association, London.—Letters of 11th and 18th November from the Secretary, Indian Tea Association, London, having been previously circulated were to be recorded. The principal subjects dealt with were:—

Festival of Empire Exhibition, 1911.—With the letter of 11th November, there was forwarded an extract from *The Standard* of the 4th idem in this connection. It was mentioned therein that one of the attractions of the Exhibition would be the Indian Section in which it was proposed to illustrate the history of India, the life of the people, Indian Art, and the progress of the country under British rule.

The General Committee were asked to ascertain if the Government of India contemplated assisting in the matter, as it was understood that they had been asked to assist with a grant of money. If so, they might be approached in regard to making a separate grant to the Indian Tea Association, so that arrangements might be made for an Indian tea room at the Exhibition where Indian Tea might be exhibited and given away in cup.

It was decided to address an enquiry to the Government of India in the Department of Commerce and Industry as to whether any decision had been arrived at as regards assisting the proposed Indian exhibit with a grant of money.

Labour.—A discussion took place regarding the serious position of the tea industry generally in respect of scarcity of labour, and in particular the unreasonable attitude taken up by the officials in the recruiting districts. At the present moment, . . . there were several other questions in connection with recruiting, which were demanding attention, such as the prohibition of recruiting in the Madras Agency tracts, recruitment of subjects of Native States, the simplicity of the procedure in, and facilities afforded to, Colonial recruitment as compared with the obstructions and difficulties placed in the way of recruitment for the districts, and so on. The feeling of the meeting was in favour of taking the whole matter up with the Government of India, and the matter would be dealt with on the return of the Chairman.

Beetles in Tea Chests.—Read letter dated 2nd December from the Secretary, Calcutta Tea Traders', forwarding papers in Association connection with this subject. It appeared that the Government of the Australian Commonwealth had notified tea importers that they were liable to a heavy penalty for wood boring beetles found in the wood of tea chests imported by them. Specimens of the beetles had been forwarded by the Association to the Imperial Entomologist at Pusa who gave a long account of them and suggested the use of harder wood for tea chests as some measure of a remedy, though, as he pointed out, beetles which will riddle even sheet lead, are likely to bore any wood. The Calcutta Tea Traders' Association asked that a copy of the Government Entomologist's Report might be sent to all members of the Association, together with a note explaining why the subject had been brought forward.

It was decided in the first place to forward the papers to the Association's Chief Scientific Officer for an expression of his opinion as to the most suitable means for preventing the lodgment of the insects in the wood of tea chests.

CORRESPONDENCE.

Quality of Coffee and Liquoring.

Sir,—Your Correspondent "Catching at Straws" suggests that East Indian coffee is now fetching such low prices from being grown under dense shade, which is the cause of the deterioration we hear so much of, and what will bring us to the fore again is more "Sunshine."

I think that in Mysore most practical planters recognise that dense shade means small crops, better shaped and bigger and heavier beans of a finer colour.

Whereas coffee grown under very light shade means heavy crops of poor quality, with a large percentage of shrivelled and mis-shapen beans and poor pale colour.

There is no doubt that in the latter case there is great deterioration in our coffee, but I contend that our coffee grown under the old conditions of more or less dense shade, when the crops are not excessive, has not deteriorated. It is all a question of supply and demand. The market is glutted with coffee, and we get a lower price, and the Broker says it is on account of our poor quality. "Catching at Straws," in his letter, gives a concrete instance of the above.

There are certain people who must have "Ceylon" coffee and will pay a fancy price for it, and Ceylon produces so little that the price keeps up. The "slim" planter has been known to ship *vid* Ceylon and reap the benefit of his "slimness."

In conclusion, I think, it is a pity we planters are constantly crying down our produce. If there is anything radically wrong about our coffee, its liquor, colour, colour or shape, let's put it right, but I don't think we do any good by decrying our coffee.

The present high price of coffee with a short Brazil crop also points to the supply not being equal to the world's demand, and I shall be much surprised if with our small crops this season we hear much about deterioration, and trust we shall find it's all

MOONSHINE.

The Commercial Intelligence Branch of the Board of Trade have received, through the Foreign Office, a copy of a despatch from H. M. Consul at Iquitos, in which he states, with regard to Rubber estates in the Department of Loreto, that it is advisable in all cases before taking up a concession covering such properties that investigation should be made as to the number and value of rubber trees on the estate. Labour in the department is extremely scarce. In working rubber properties it is almost impossible to obtain wage labour; the system in use is to pay the labourer in proportion to the market price of the rubber in Europe, he being credited for all rubber he delivers at about 25 or 30 per cent. under market price.

The coffee industry is one of the oldest in Hawaii, and at one time was conducted chiefly by Americans, but owing to low prices has fallen largely into the hands of Japanese. The output is variable. The quality is superior. About 4,500 acres are cultivated, averaging 600 or 700 lbs. per acre.

The rubber industry is still in the experimental stage, although the experiments of last year in tapping and in the use of temporary fertilisers during the tapping period have been most promising. On the six principal plantations—four at Nahiki on Maui, one at Puna (Hawaii) and one at Kailua (Oahu)—there are now about 1,600 acres planted with about 600 Castilloa trees, 66,700 Hevea trees and 444,450 Ceará trees.

COFFEE.

Over a Century Ago.

We reprint from the *Annual Register*, 1791, the following "Observations on the curing of Coffee, and of sending it from the West India Islands in a new Mode;" by Mr. Isaac Titford, of Spanish Town, Jamaica, from the *Transactions of the Society of Arts* :—

Coffee being an article lately much increased in demand in Europe and America, and in consequence commanding a high price, which has induced many planters lately to cultivate it; I beg leave to submit to the society a plan now done. The mode now used in general, by the planter, when the coffee is ripe on the trees, is as follows :

They bring the coffee to a machine called a peeling-mill, where it is divested of its outside skin and pulp; after which, it is put in heaps, and undergoes a slight fermentation; then spread out, and dried on platforms or terraces, until it is perfectly cured, when it is stored until all the crop is got in.

The berries ripening so fast, it requires every exertion of the planter's strength to get in the fruit in due time.

When the crop is over, they begin to prepare it for market, by again putting it in the sun, and carrying it to the peeling and winnowing mills, where it is totally divested of its coats and impurities, and the broken and bad coffee picked out, &c., after which it is fit for market.

It must be observed, only the most considerable coffee-planters have the above mills; the small and needy planters beat out their coffee in large wooden mortars, or troughs, by which a waste is made by breaking the berry.

When any coffee is kept for private use, or island consumption, it does not undergo the above processes; but the ripe fruit, as it is picked from the trees, is spread out in the sun, and simply well dried, and beat out as it is wanted for use or sale.

Coffee is well-known to improve, when so preserved, by drying it in the berry; but to daily impair and fall off, when it is divested of its coverings, as it now sent to market; for which reason the planter does not beat out his coffee, till ready to sent it.

Upon the above facts, I will endeavour to point out the advantages that will be derived by coffee being sent home in the whole berry, well dried, and also the objections and difficulties that will attend such mode.

One advantage will be, the causing less trouble, and requiring less negro-labour, at a time of the year when the planter is the most employed. And this is an object to the planter, by saving the hire of negroes, which is very high during crop; and sometimes they cannot be procured, in which case the coffee drops off the trees and is lost.

The next is, the prevention of the coffee imbibing the ill flavour of sugar, rum, pimento, &c., which may be shipped with it, and which, I understand, is the principal objection to this country coffee being used in England.

It is presumed the natural coverings will effectually prevent any lead impregnations in its passage. The increase of freight will be of some importance, particularly if coffee is cultivated as it has been lately; but the translation of labour and trouble from the planter, by tedious negro-labour, to the superior mechanism of Great Britain; and above all, the improved condition, and superior quality, in which it is conceived the coffee will arrive at a foreign port; will make ample compensation for such additional change.

Also still farther improvement, until the time it is wanted for sale or use. If wanted for the foreign market ; in England, mills could be easily constructed, so as to do many thousand weight a day ; whereas the expenses of mills and other machines in this country are a very heavy contingency to the planter. For home consumption, a retailer might purchase a small quantity, and beat it out as he wants it, as he certainly would keep it in the state it was improving in ; by which the consumer would get coffee of the finest quality, I should hope equal to the Mocha, at a very moderate price.

The sale of coffee in the berry, in point of product and quantity, can be easily ascertained, by beating out a certain quantity, and finding the quantity of good clean coffee.

The objections the planters will have to the above mode is, first, the requiring a very great care and attention to the coffee when drying, as well as incurring some expence by erecting terraces and sheds to keep it from getting wet in curing it. Yet it is hoped they would consider the quickness of its getting to market, which the saving of the time in pulping, peeling, picking it clean, etc., will amply compensate ; and the saving the expence of erecting mills would be more than adequate to the extra terraces, etc.

Extra carriage, package, and freight, are inconveniences and objections only to be done away by its fetching a better price when at market : the first is of more consequence than probably may be imagined in England, by reason of bad mountainous roads, where the crops can be only brought to market by negroes or mules.

The novelty of its state for market and sale, is, I presume, an objection only to be remedied, by first encouraging the shipping it for England, that the merchants and dealers may have opportunities to ascertain its value, and render it commercial.

It is for the society to judge whether the proposed mode is worthy their patronage and attention, after comparing the samples sent herewith ; nothing but an advantage either in labour or price will induce a planter to alter a mode long established.

This country, I am well assured, is capable of producing coffee equal in quality to any of the West-India Islands ; and I hope the society will find the proposed improvement deserving their attention.

I conceive it to be possible, to kiln-dry the coffee in the berry without injuring the quality ; this, if found to succeed, will do away one of the principal objections the planter will have to this method, particularly those who live in the wet parishes, where the frequency of the rain would make the drying it on terraces very difficult.

From the small quantity of land required, the trifling expence of planting it, and not requiring many labourers, except in crop, and those not of the ablest kind, it is become a great object in this island, and principally with the small settlers of little strength and capital to begin with. I am well informed a plantation of about one hundred and fifty acres, in coffee, made this year one hundred and twenty thousand weight, which sold at Kingston for five guineas per hundred weight, currency ; a sum equal to four thousand four hundred pounds sterling.

The imports of coffee into France in 1909-10 again showed an increase, being 2,142,000 cwts., value £4,492,000, against 2,054,000 cwts., representing a value of £4,172,360 in 1908. The average price of the article underwent a slight rise, 104 fr. per 100 kilos., in lieu of 101 fr. 50 c. The principal imports were from Brazil and Hayti, but supplies also came from British India, Venezuela, the United States, Nicaragua, Porto Rico and Colombia.. French Colonies furnished 41,860 cwts., representing a value of £87,080.

ER.

Coagulation of Para Latex.

Source of a letter to the *India-Rubber Journal* on "The Right Use of Acetic Acid in the Coagulation of Hevea Latex," Mr. John Parkin.

Schidrowitz, in the continuation of his notes on a recent visit to Ceylon and Malaya ("I.R.J.," November 14th 1910, p.679), touches upon the importance of acetic acid to rubber planters, viz., the coagulation of Hevea latex with acetic acid.

As I was responsible* for introducing the acetic acid method of preparing Hevea rubber in 1898-99, when acting as scientific assistant to Dr. Schidrowitz at Peradeniya, Ceylon, the remark of Dr. Schidrowitz that "at the present time probably 99½ per cent. of all the plantation rubber produced is coagulated in this manner," has distinctly impressed me. In spite of the advocacy of formic acid, "purub," etc., acetic acid still holds the field; and further the new method of smoking, known as the Da Costa process, does not yet appear to have been to any extent adopted.

In view of the above remark of Dr. Schidrowitz it seems most important that the acetic acid method of coagulation should be rightly employed, for upon its proper application largely depends the quality of the rubber produced. An excess of acid, especially if not completely removed by washing, will have a deleterious effect on the rubber; besides it is not economical.

From Dr. Schidrowitz's further remarks on this subject it would appear that on some estates the method is used in a very haphazard fashion. Consequently I wish to emphasise the importance of carefully regulating the amount of acid used, by drawing attention to some of the points to be observed in carrying out this method of coagulation.

In the Ceylon experiments it was always found that there was an optimum strength of acid required—much above or below this quantity led to incomplete coagulation, and thus to loss of caoutchouc. A sure indication of right coagulation is a clear "whey." No turbidity should be observable in the liquid after the removal of the rubber clots. This is quite easy to reach in laboratory experiments, and should, I think, be attainable with care in the factory.

Acetic was especially recommended in preference to other acids, because it allows a wider margin in its use. No extreme accuracy is required. A moderate error in the quantity added either way is permissible.

Another point of great importance to bear in mind is that the percentage of acid necessary is proportional only to the original volume of latex present, and is independent of its dilution with water. This, of course, presents a slight difficulty, as the latex, I presume, is rarely coagulated on the estates in its undiluted form. Faulty coagulation will often result, if the acid be added in proportion to the total bulk of liquid, instead of to the original volume of pure latex contained in it. In the Ceylon experiments of 1898-99 about one gram of pure acetic acid was found to be needed for 100 cubic centimetres of latex—approximately one volume of acid to 100 volumes of undiluted latex. If this quantity of latex be diluted two, three or more

* This is asserted with some trepidation, for recently the Director of the Singapore Botanic Gardens has laid claim to the priority of Malay over Ceylon in several matters discovered in connection with the science of rubber cultivation. However, in his article, as far as I am aware, he is silent as to the introduction of the acetic acid method of coagulation.

times with water the same amount of acid will be required, and not as might be thought double, treble, etc., this amount.

Again it may be the practice on some estates to use slightly ammoniated water. In this case a further disturbing factor is introduced. The ammonia (unless driven off by heat) must first be satisfied before the acid can bring about coagulation, and so more will be required than under ordinary conditions.

It seems to me that the proper way to control the coagulation would be to test first a small quantity of the large volume of diluted latex awaiting treatment. This could be so arranged as to occupy only a few minutes. A spirit lamp, a few test tubes, and one or two other simple chemical devices are all that would be required. Heating brings about the coagulation much more rapidly, hence the value of the spirit lamp or some similar contrivance. The quantity of acid required is the same in either heat or cold. A simple calculation from this preliminary test will give the amount of acid to be added to the large bulk of dilute latex, the volume of which has been previously measured.

The supervisor of this part of the proceedings in the factory would soon have a good idea of the quantity of acid needed, so that the test for each lot of latex would be carried out very quickly as a rule, serving more as a precaution or check than anything else. The strength of the acetic acid employed must also be known, as I imagine that pure (glacial) acetic, will be rarely used on the estates.

The above suggestions are written in no dogmatic spirit. The latex of Hevea may behave differently at times, requiring varying amounts of acid. This, of course, can easily be put to the test. I have merely indicated by way of illustration some of my experiences with the latex of old trees growing in Ceylon.

Further, I do not wish to hold any brief for the acetic acid method of preparing Hevea latex. Other means may eventually be found superior. The Amazon method hardly seems workable in the East, as the watery latex would be too thin for dry smoking; but the Da Costa process, "wet smoking" as it might be called, appears applicable.

I have on more than one occasion stongly advocated curing in conjunction with coagulation; and further I do not think that plantation Pará rubber will ever be wholly satisfactory without this combination—it will still lack to some extent the "nerve" and keeping qualities of Fine Hard Pará. How to combine the two—clothing and curing—to the best advantage is the problem. Smoked sheet is only a compromise.

In the meantime as long as simple acetic acid coagulation is adhered to in the preparation of plantation rubber, directors and managers of estates cannot be too wide awake in seeing that this method is properly applied. Once an estate gets a bad name for its rubber, it will find difficulty in gaining the favour of the market, even when its product has improved greatly in quality. Besides, faulty preparation on the part of a few estates reflects badly on the industry as a whole. Further, the shareholders in such companies suffer; for a less price per lb., even if only a few pence, means in the year a considerable diminution in the dividend.

The services of the chemist in rubber planting is only second in importance to those of the mycologist. Healthy trees are only a means to an end. The end should be a raw rubber of first-rate quality, rivalling in every respect Brazilian Pará.

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